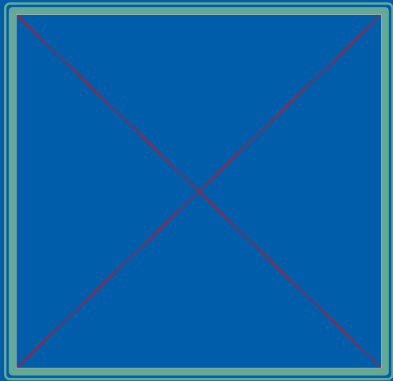




Identification and Modifiable Risk Factors of Jockey Injuries

**2015 Welfare and Safety of the Racehorse Summit
Keeneland Sales Pavilion
Wednesday, July 8 2015**



Carl G. Mattacola, PhD, ATC, FNATA
Department of Rehabilitation Sciences
College of Health Sciences

see blue.

Purpose

- To determine peak accelerations (G) between common equestrian helmets using ASTM standards.



- Jeff Johnston

- Helmet models must meet requirements ASTM F1163



- 300 G's is the accepted international threshold for serious brain injury and thus is used as the standard normative comparison.
- After 4 impacts it should not allow 300G's to pass through it.

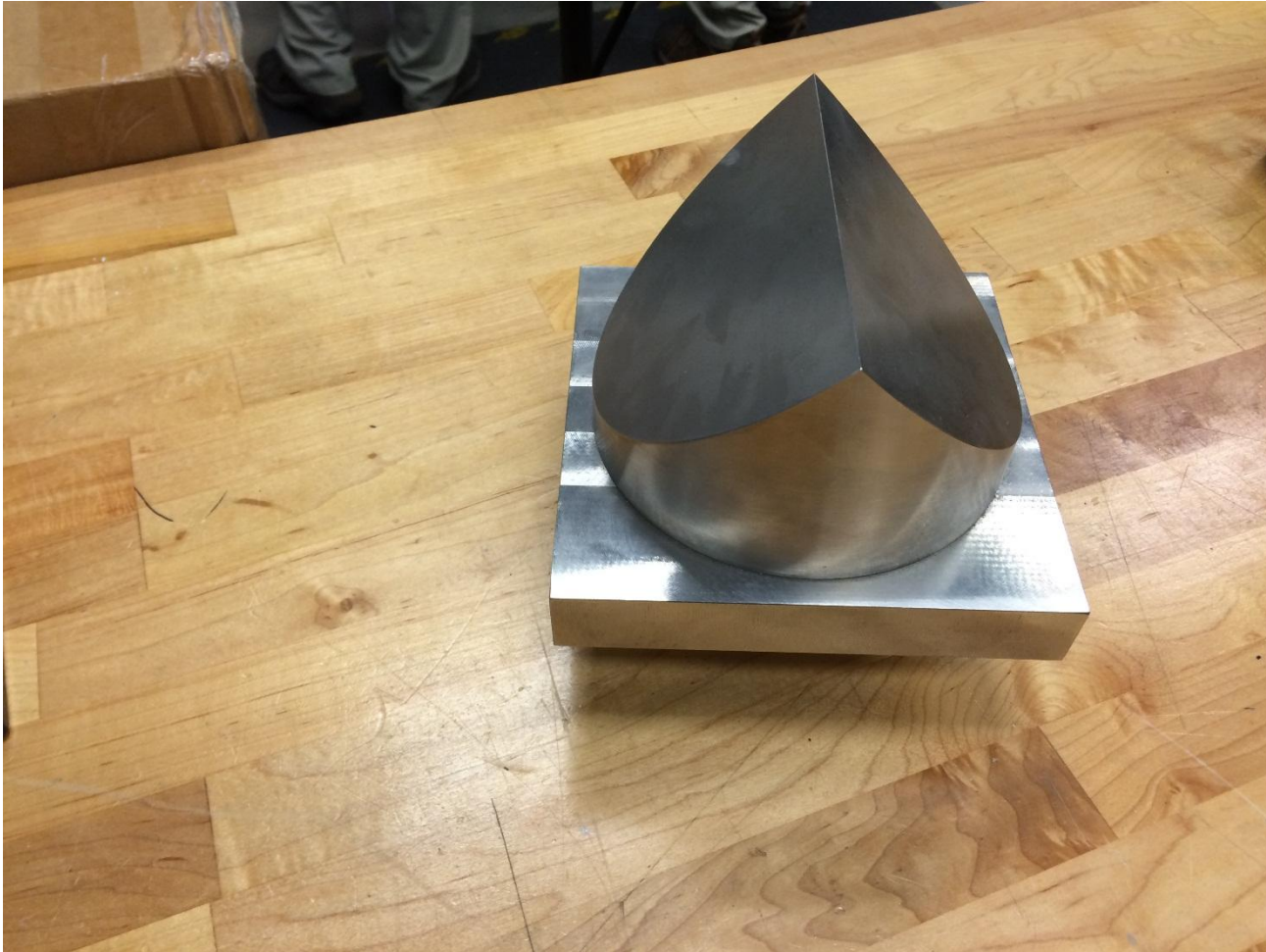
ASTM Testing Procedure

- The helmets for Test Group 1 were impacted once on four locations (Front, Left, Right, and Back) with the standard head mass configuration.
- The time duration between impacts did not exceed 2 minutes and was not less than 1 minute. No individual acceleration was to exceed 300 G (gravitational constant).

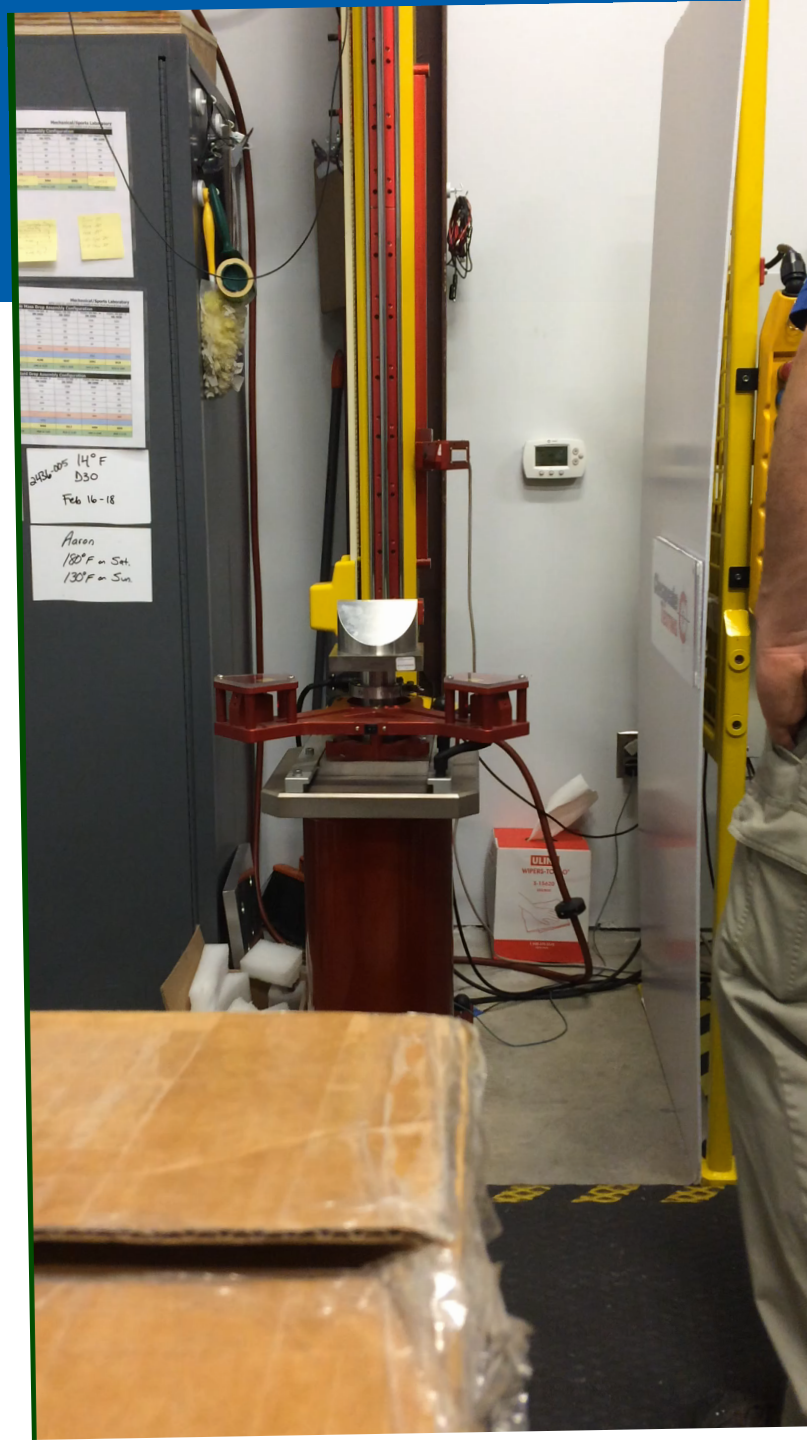
Flat Anvil

- See video

Equestrian Anvil



Helmets were Struck with Equestrian Anvil



Helmets

Helmet	Model Number	Model
GPA	C 5085	Jock UpThree
Charles Owens	J3	
LAS	E 5059	JC Jockey Helmet
UoF	J4912	EVO Jockey Helmet
Champion	J4912	Euro Deluxe
Troxel Special Production Low Density Liner 40g/l	J4912	40g/l
Caliente Style Riding Helmet	J4912	Jockey Racing Helmet Argentina

Flat Anvil

Helmet	Model Number	Model	Front Flat	Left Flat	Mean of Flat	Cumulative of Flat
GPA	C 5085	Jock UpThree	190.9	209.4	200.2	400.3
Charles Owens	J3		205.3	219.3	212.3	424.6
LAS	E 5059	JC Jockey Helmet	213.0	232.4	222.7	445.4
UoF	J4912	EVO Jockey Helmet	249.1	264.0	256.6	513.1
Champion	J4912	Euro Deluxe	374.1	240.5	307.3	614.6
Troxel Special Production Low Density Liner 40g/l	J4912	40g/l	706.2	207.6	456.9	913.8
Caliente Style Riding Helmet	J4912	Jockey Racing Helmet Argentina	923.0	*923.0	923.0	*1846.0

Equestrian Anvil

Helmet	Right Equestrian	Back Equestrian	Mean of Equestrian	Cumulative G of Equestrian
GPA	103.8	96.6	100.2	200.4
Charles Owens	113.7	100.2	107.0	213.9
LAS	123.6	168.3	146.0	291.9
UoF	117.8	525.3	321.6	643.1
Champion	116.9	114.6	115.8	231.5
Troxel Special Production Low Density Liner 40g/l	263.5	280.2	271.9	543.7
Caliente Style Riding Helmet	426.0		426.0	426.0



- The helmets for Test Group 2 were impacted four times on the crown location and were x-rayed before testing and after Impact No. 1 and 4.

- The helmets for Test Group 3 were impacted four times on the crown with a headz XP liner placed inside the helmet.
- The helmets for Test Group 4 were impacted four times on the crown with an Unequal helmet liner placed inside the helmet.

- All testing completed on “dirt” surfaces were for reference only. Testing on each surface was conducted at the ASTM F1163 drop height to measure the approximate acceleration that a 5.0 kg head would undergo when striking with no helmet.
- Upon measuring the acceleration with each “dirt” surface, the “dirt” was switched with a 1” MEP pad to recreate the accelerations measured when testing with the “dirt” by altering the drop height.

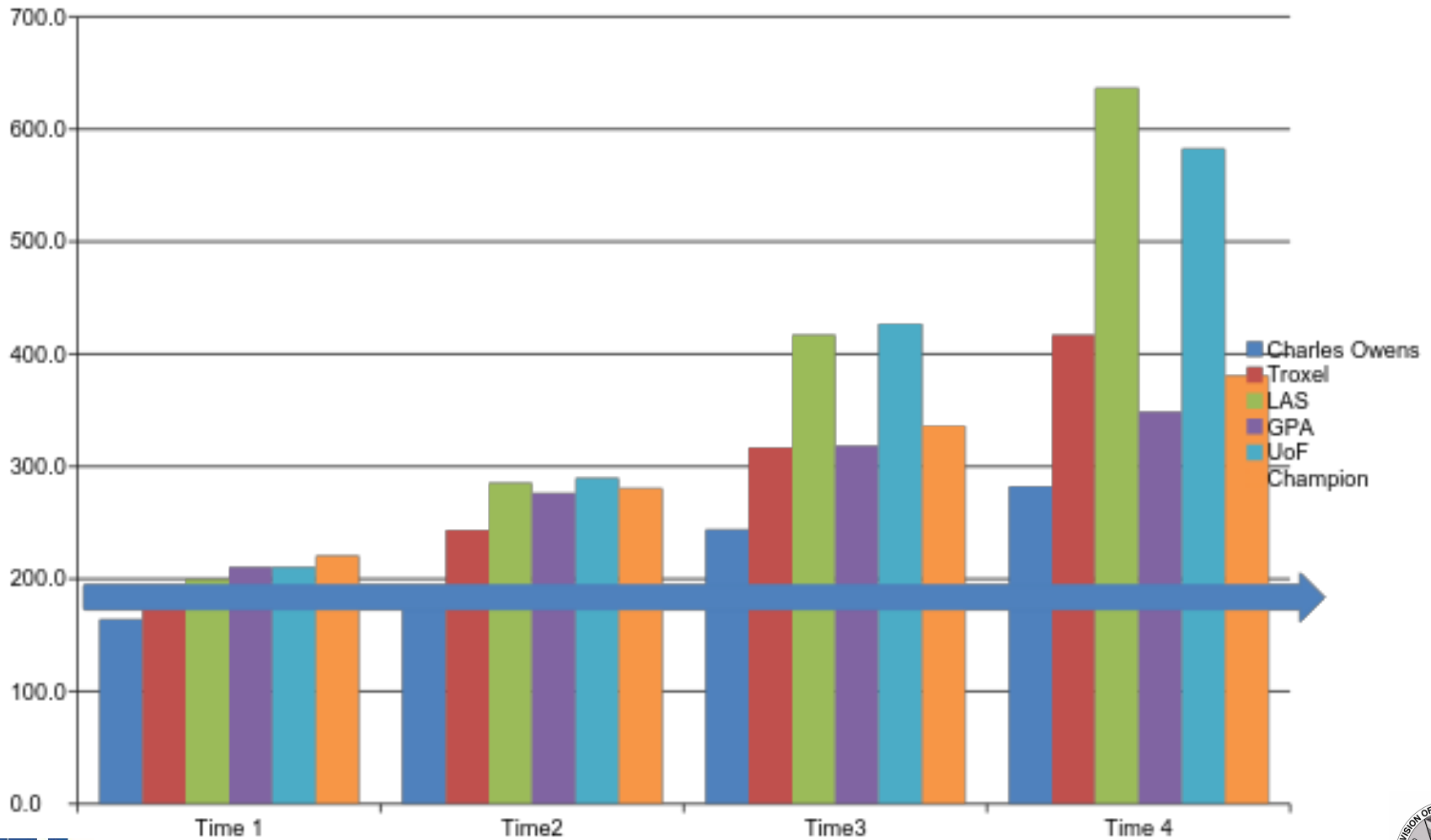
Purpose

- To determine peak accelerations (G) between common equestrian helmets following repetitive impacts.
- Dependent Variables
 - Peak Acceleration (g)
 - Deformation of material (mm)

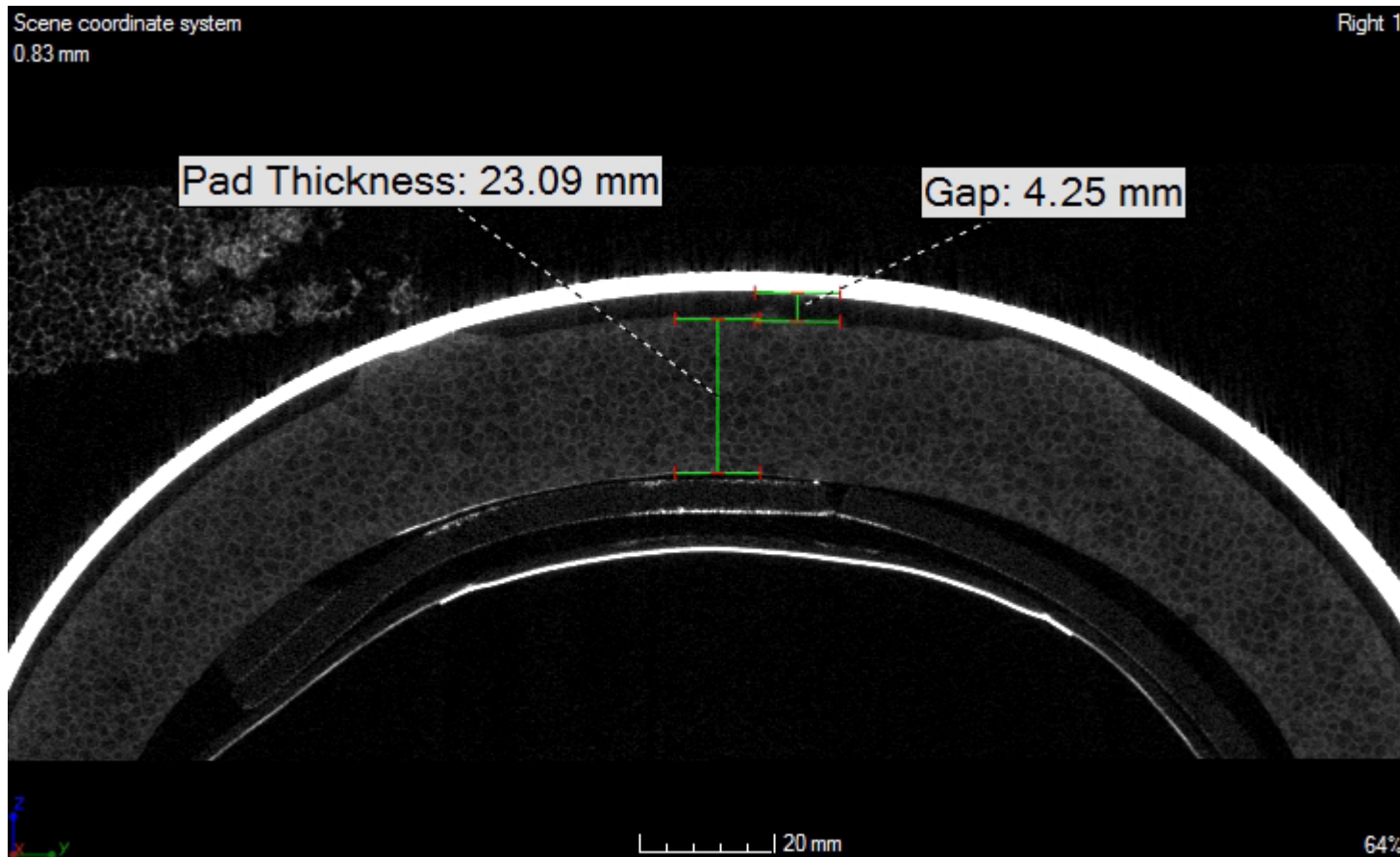
Percentage Increase from Repetitive Impact

Model	Time 1	Time2	Time3	Time 4	% increase Time 1 to Time 2	% increase Time 1 to Time 3	% increase Time 1 to Time 4
Charles Owens	164.3	190.4	244.1	282.0	15.89%	48.6%	71.6%
Champion	220.7	280.7	336.2	380.9	27.19%	52.3%	72.6%
Troxel	185.5	243.2	316.8	417.0	31.11%	70.8%	124.8%
GPA	210.3	276.2	318.6	348.4	31.34%	51.5%	65.7%
UoF	210.3	289.7	426.9	583.0	37.76%	103.0%	177.2%
LAS	199.5	285.7	417.0	636.8	43.21%	109.0%	219.2%

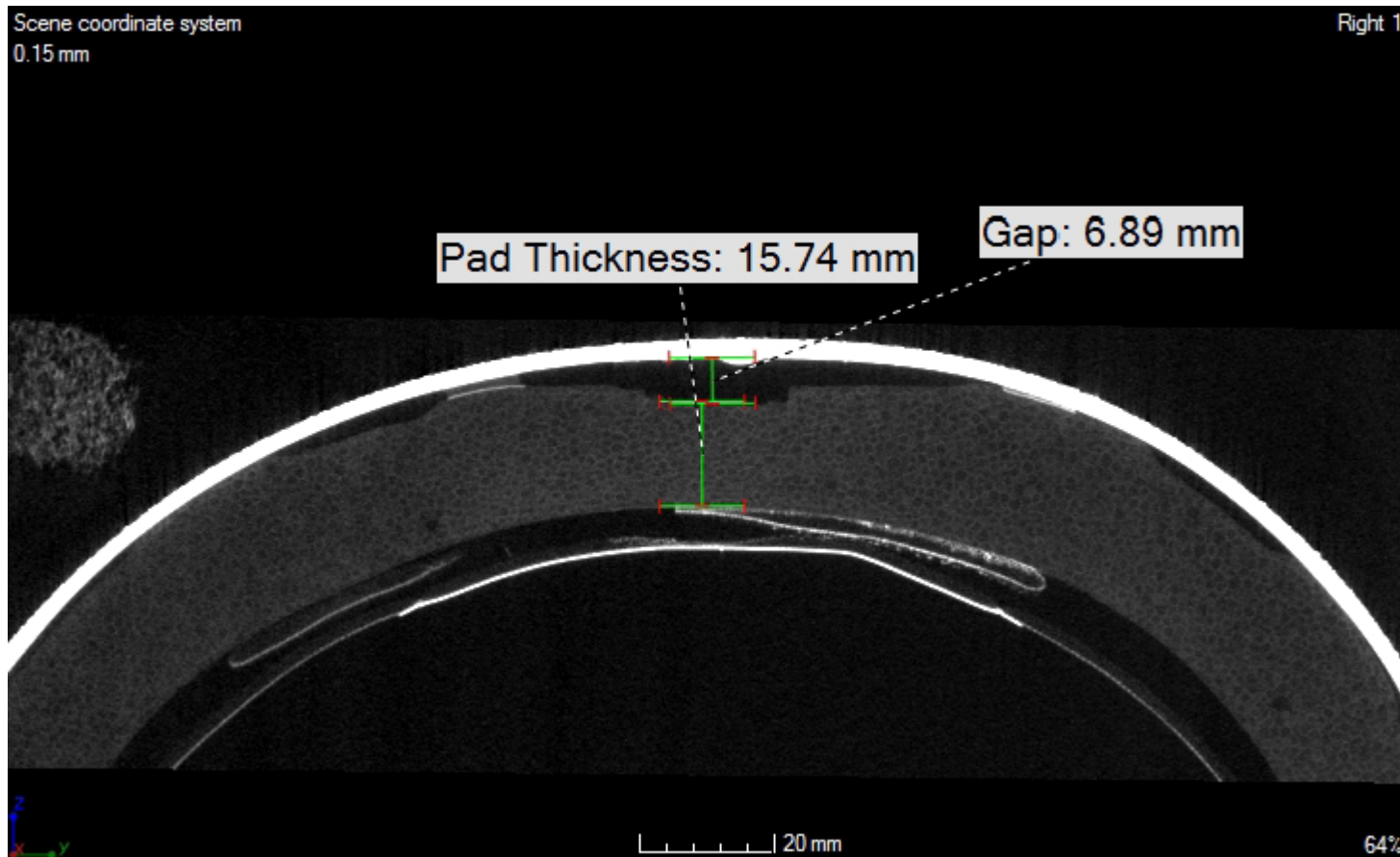
Helmets below 300 G's after Multiple Impacts



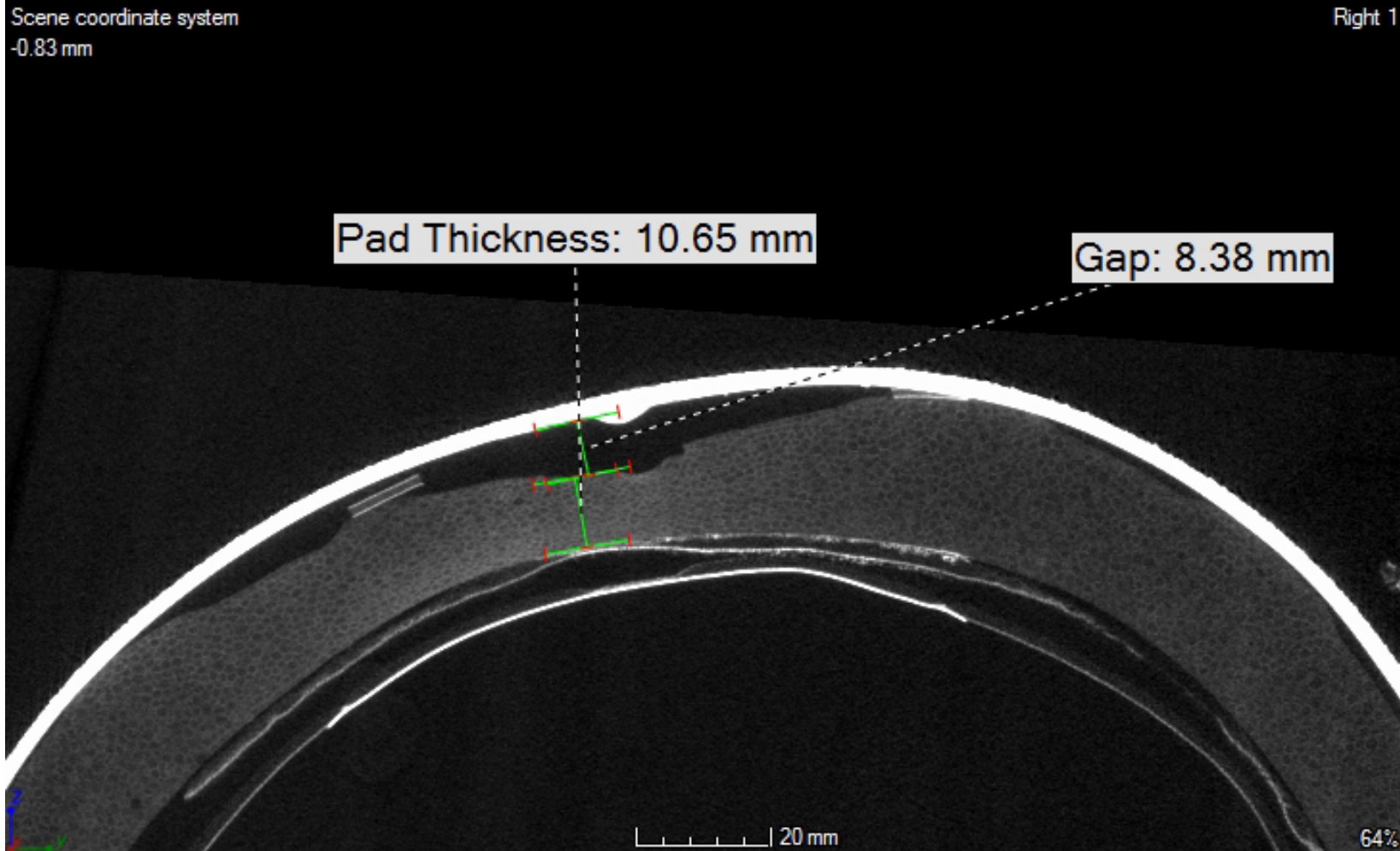
Champion - Pre Drop



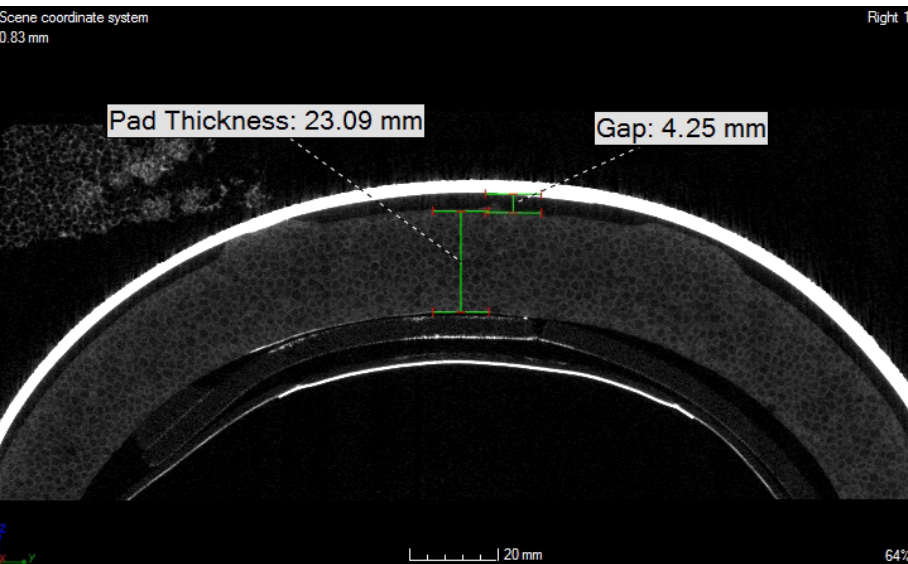
Champion – Drop 1



Champion – Drop 4

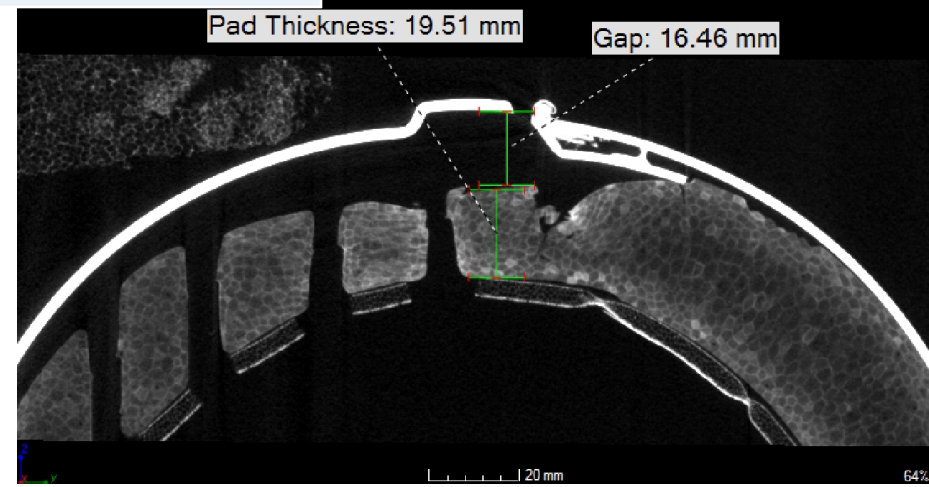


Champion - Pre Drop to Drop 4



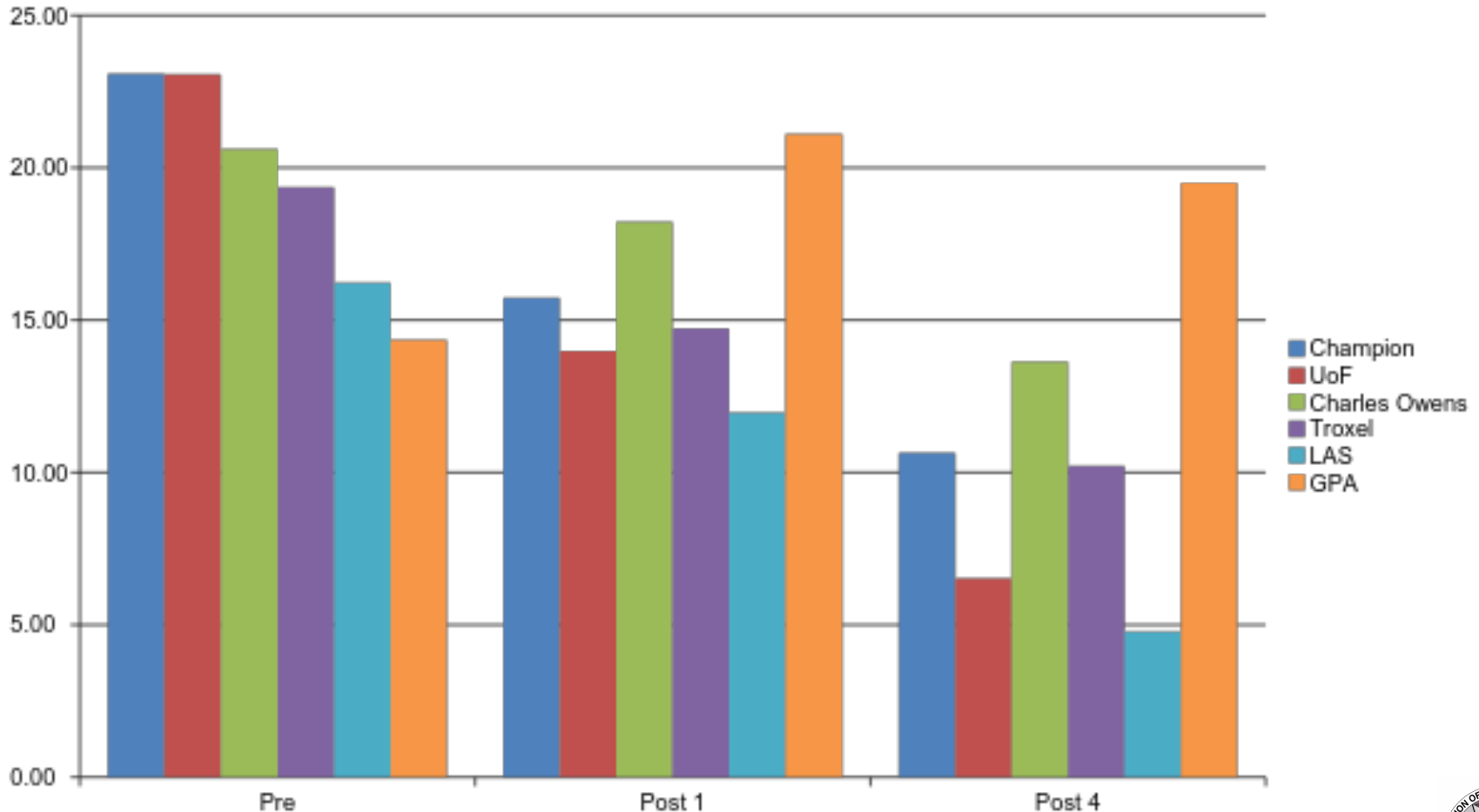
Change in the size of the padding in the helmet after repetitive impacts

Pad mm	Pre	Post 1	Post 4	% Decrease Pre - Post 4
Champion	23.09	15.74	10.65	53.88%
UoF	23.07	13.99	6.52	71.74%
Charles Owens	20.61	18.22	13.64	33.82%
Troxel	19.35	14.72	10.22	47.18%
LAS	16.22	11.96	4.77	70.59%
GPA	14.36	21.11	19.51	-35.86%



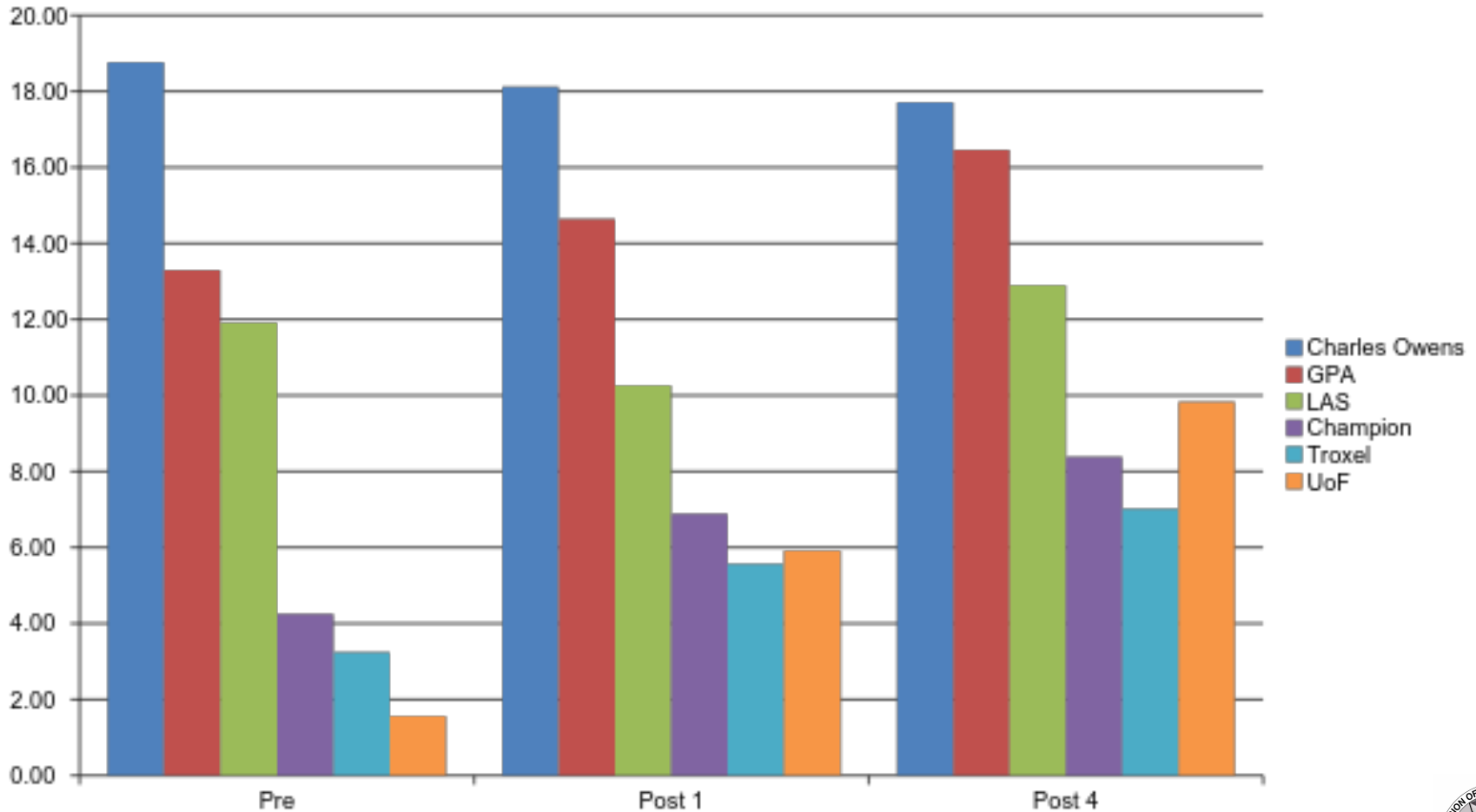
Pad mm

Pre- Post 1 – Post 4

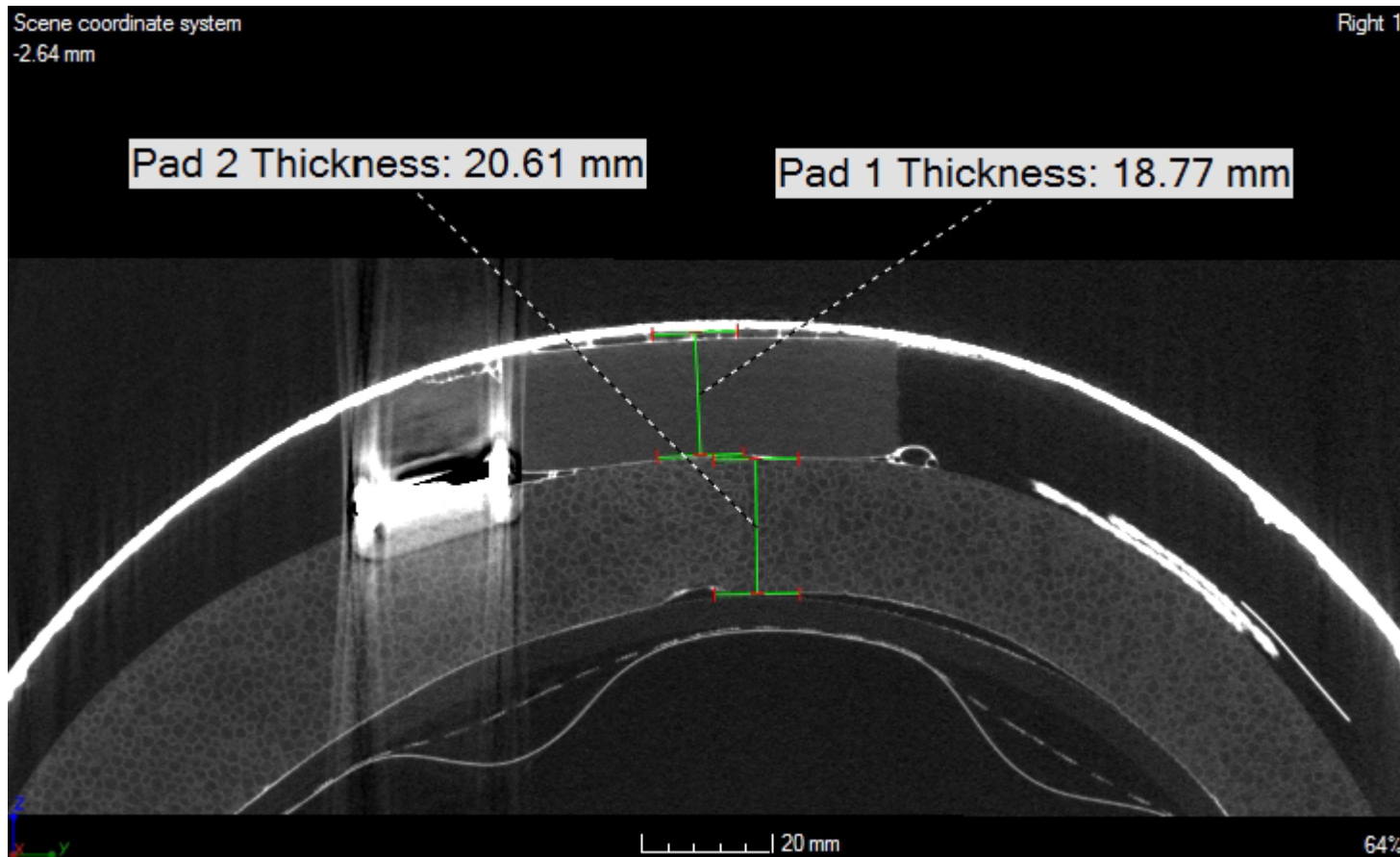


Gap mm

Pre-Post 1 – Post 4

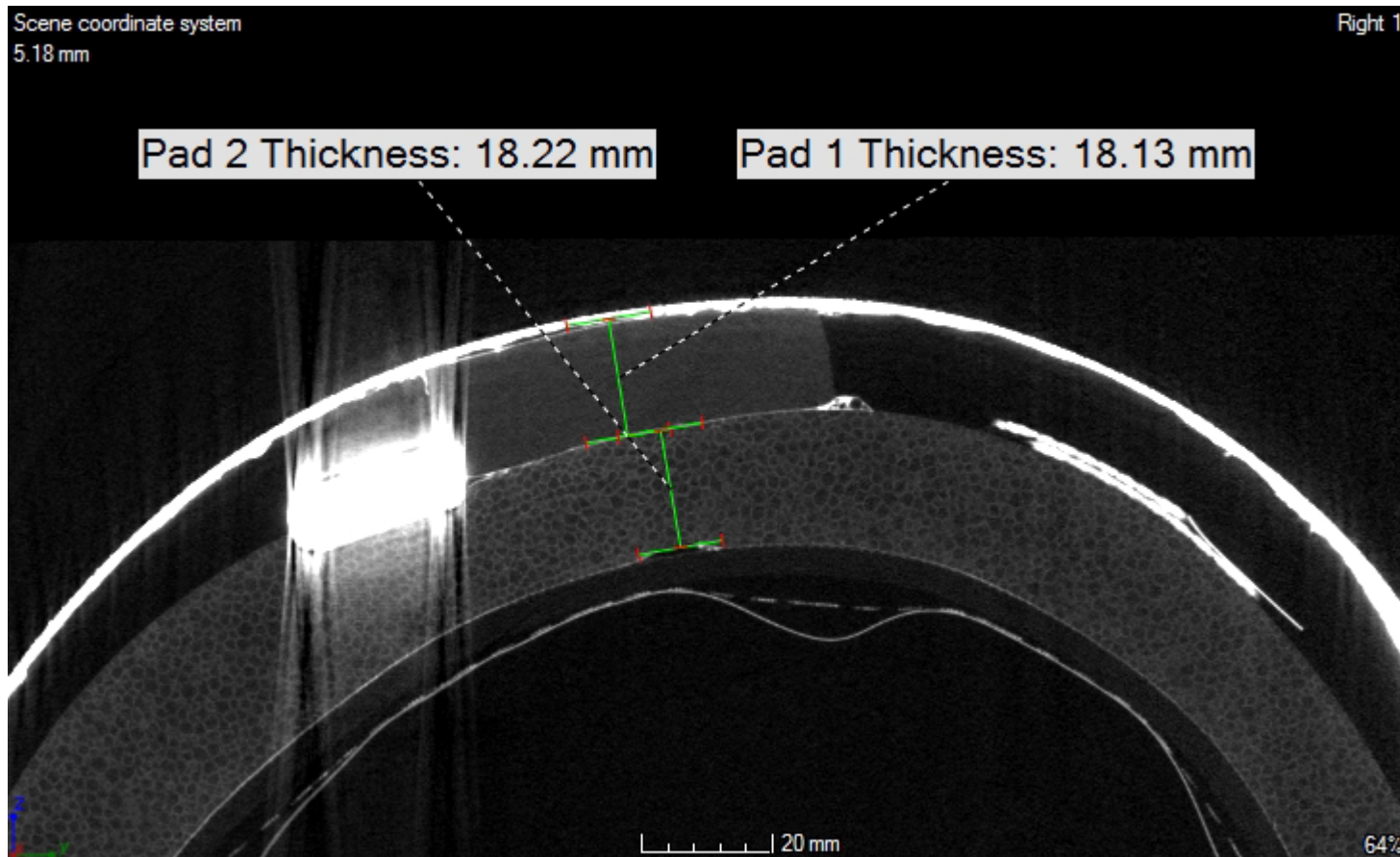


Interesting Charles Owens Pre drop



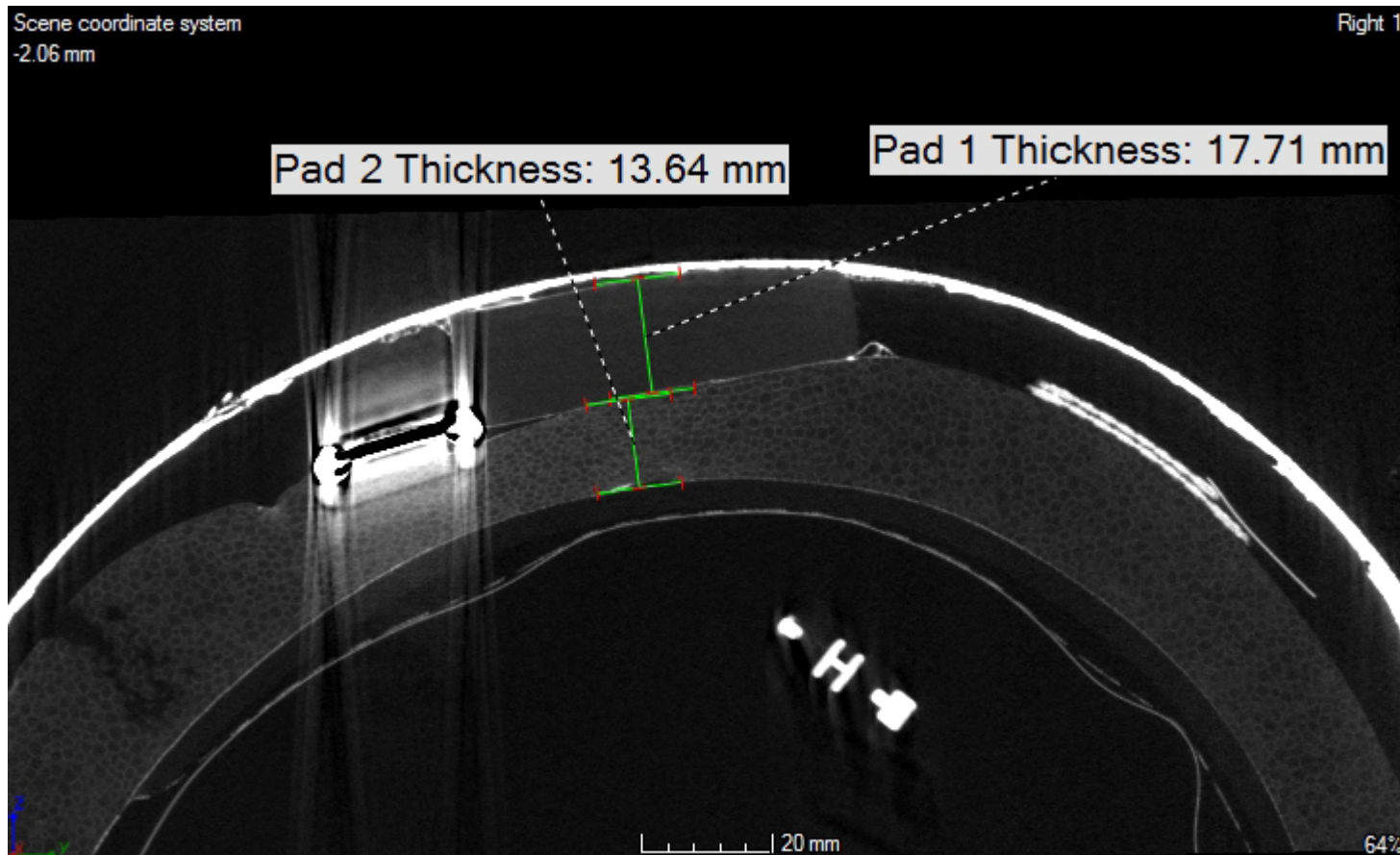
Charles Owens

Drop 1

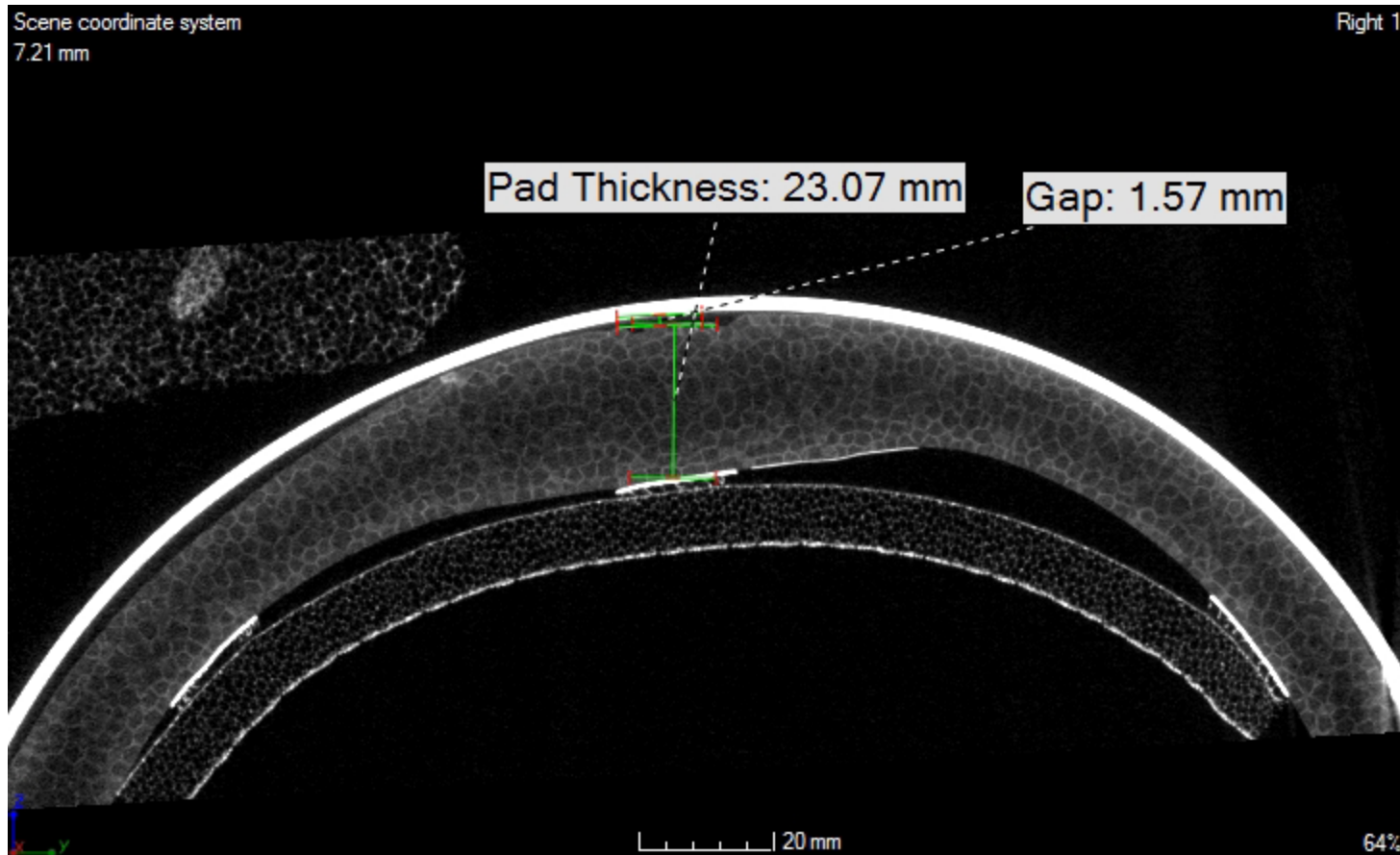


Charles Owens

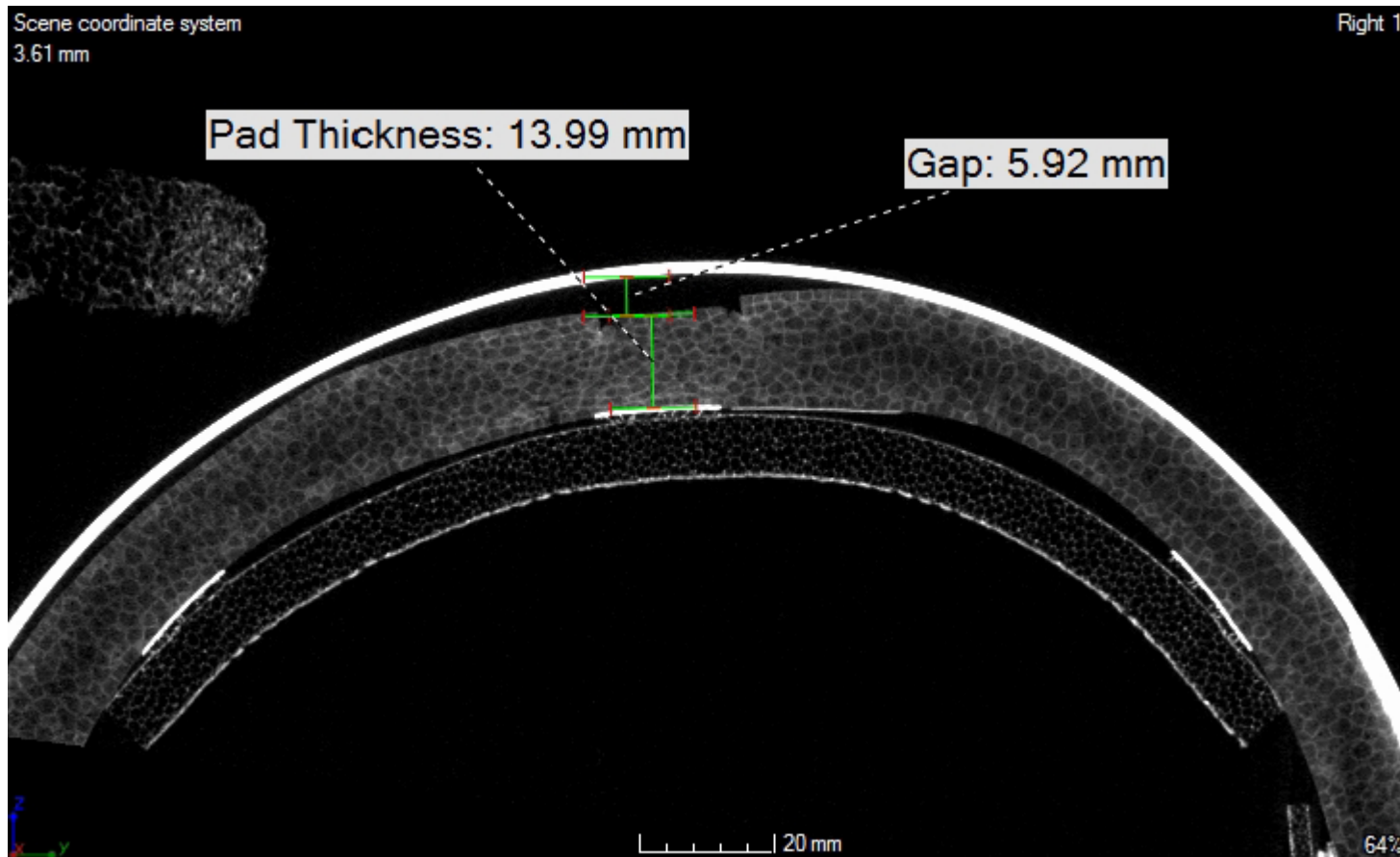
Drop 4



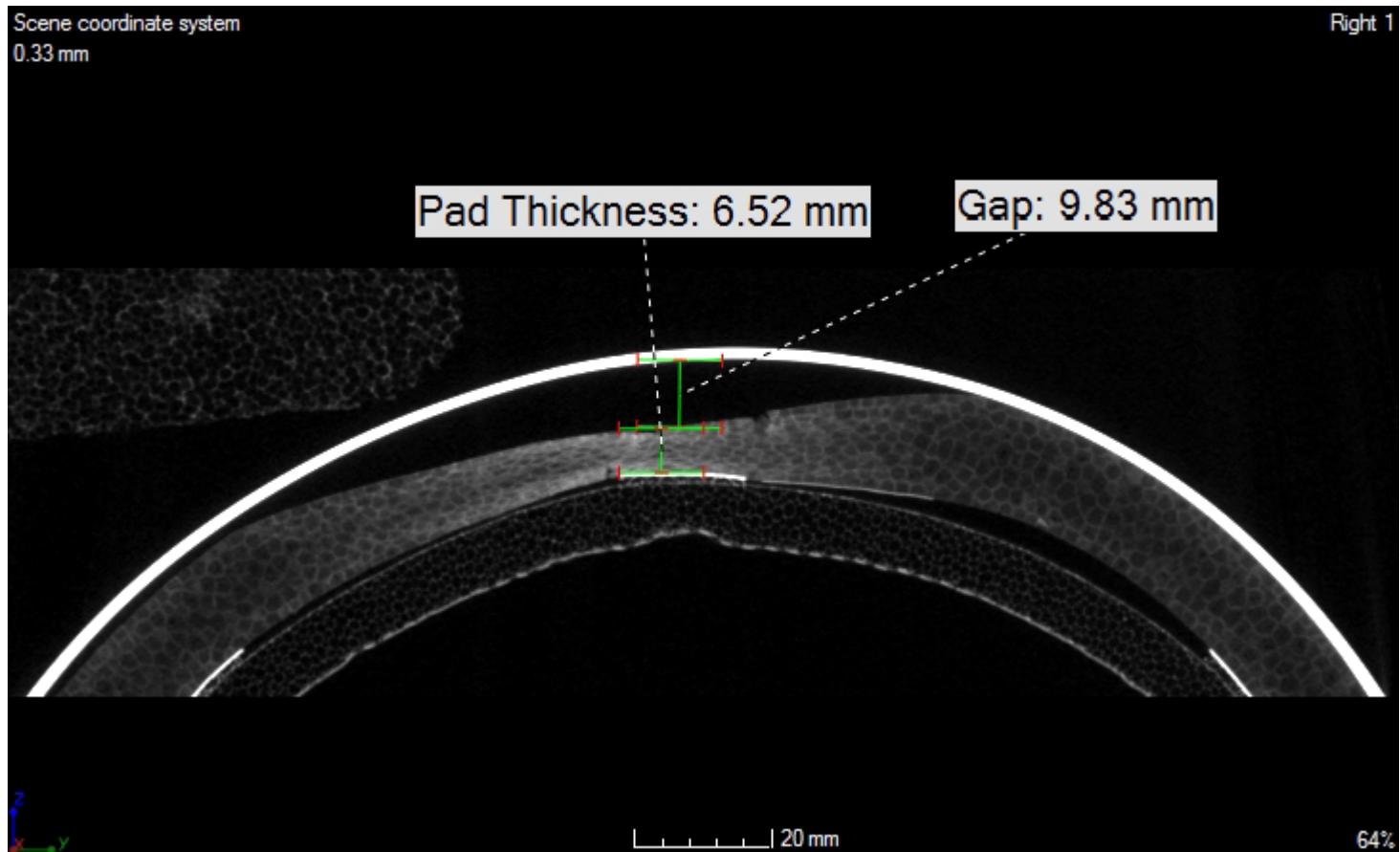
UoF Pre



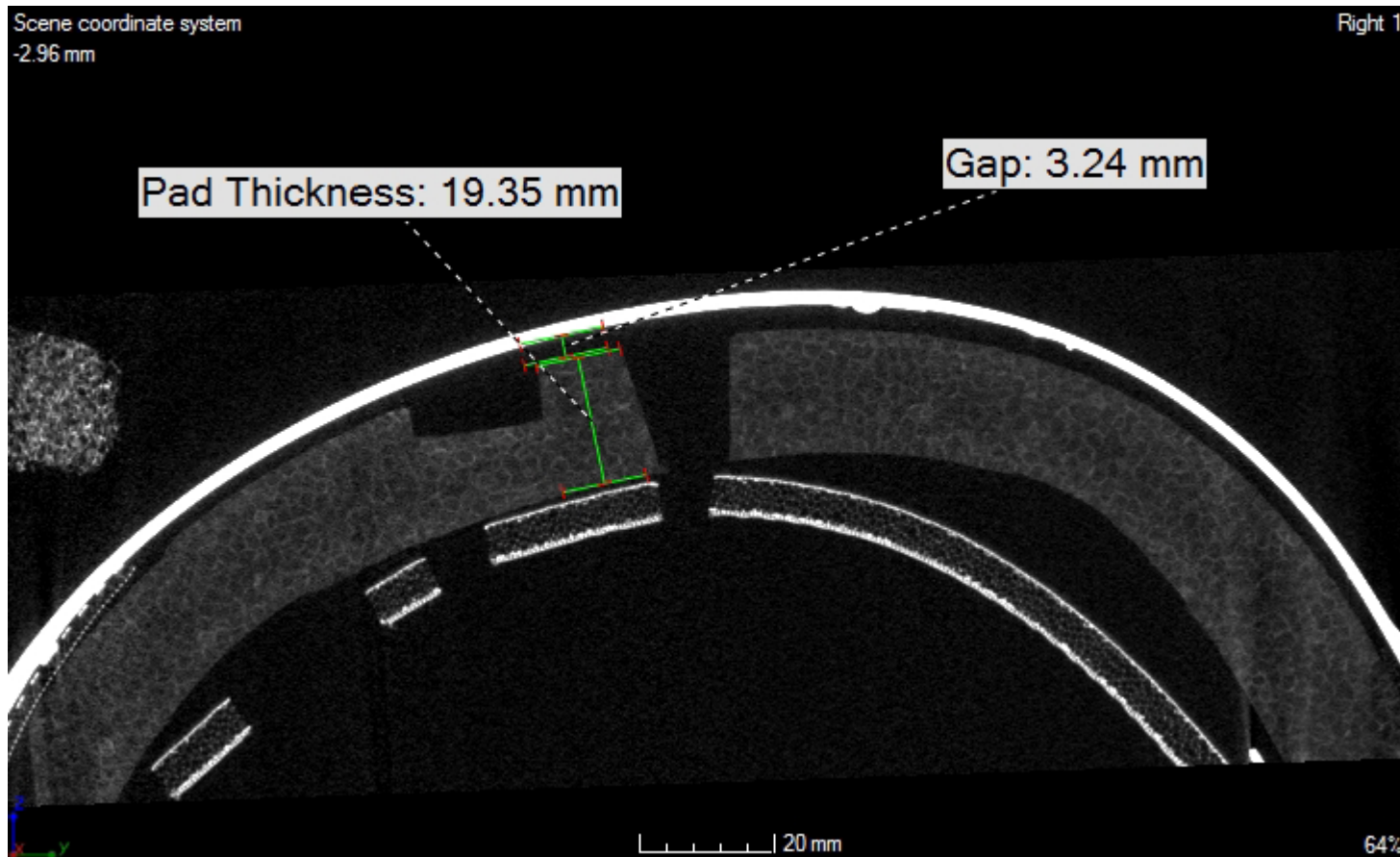
UofF Drop 1



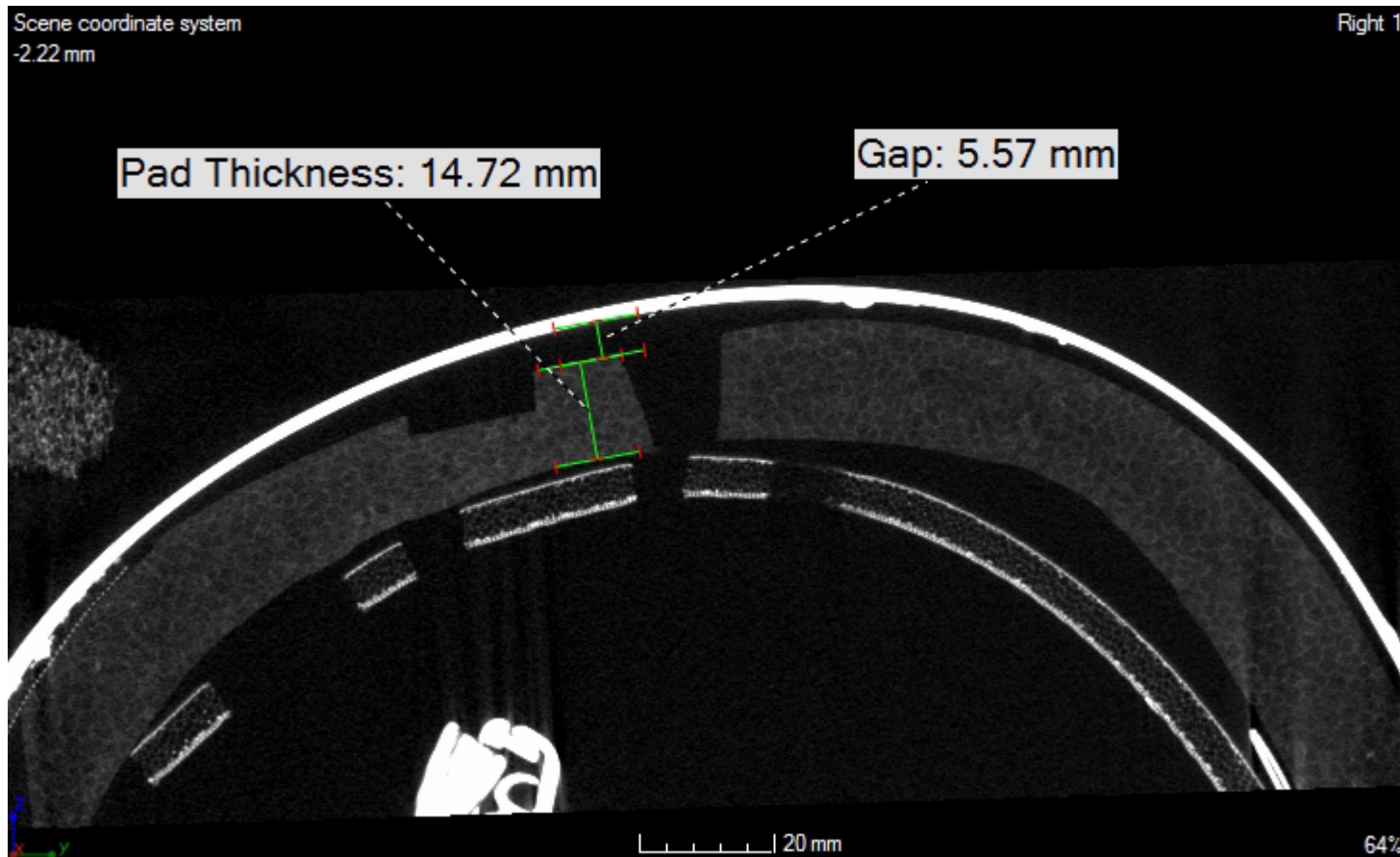
UoF Drop 4



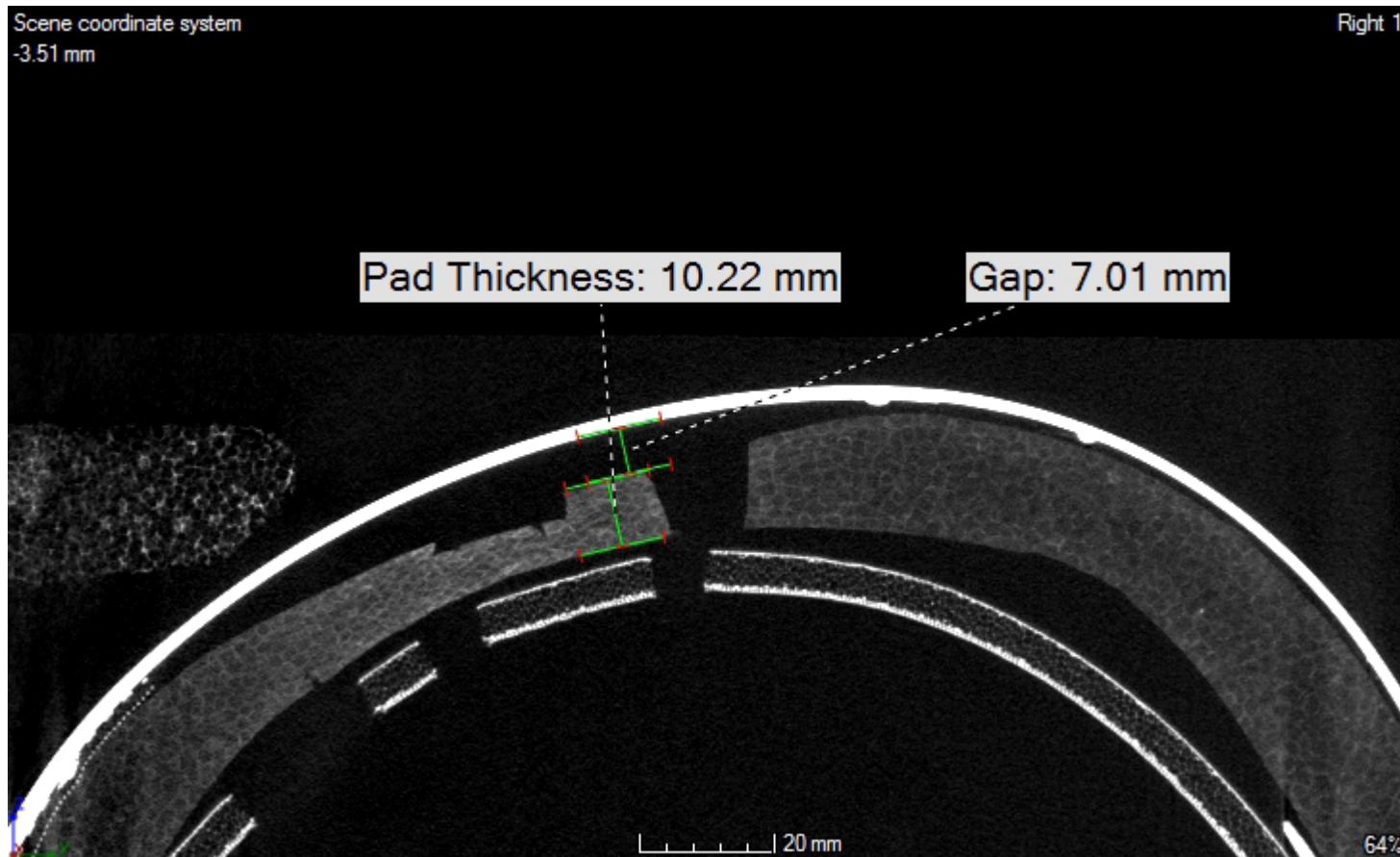
Troxel Pre



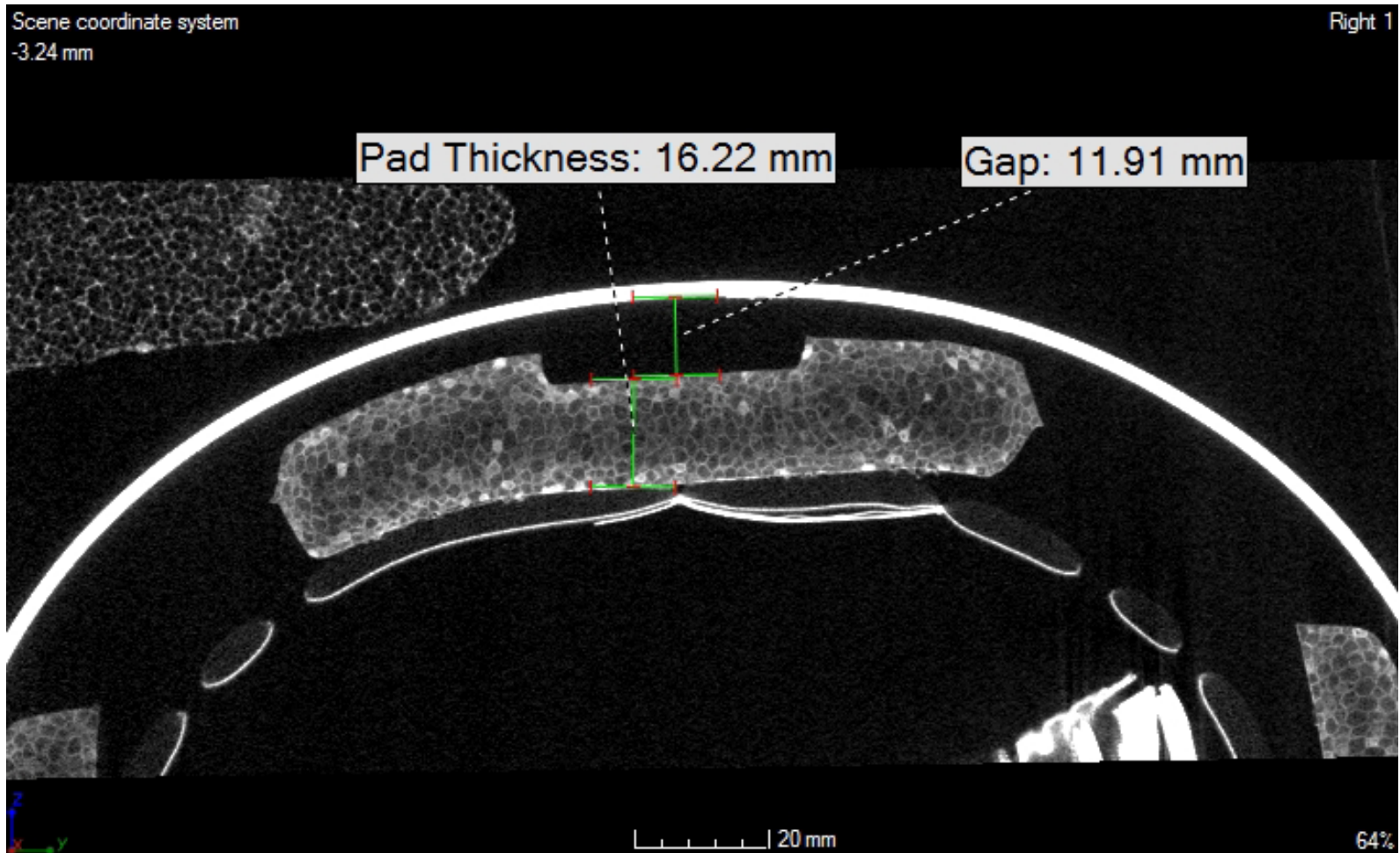
Troxel Drop 1



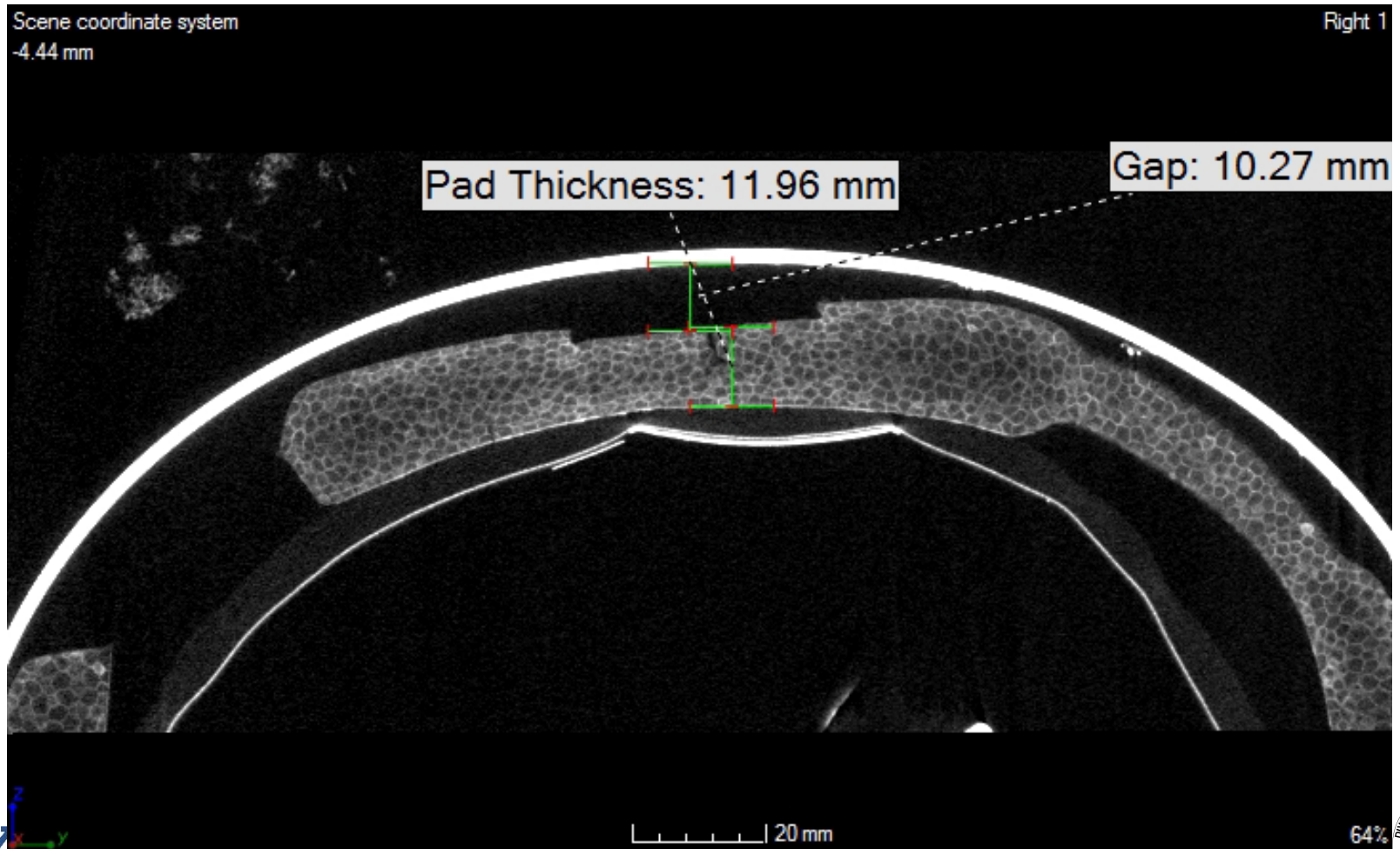
Troxel Drop 4



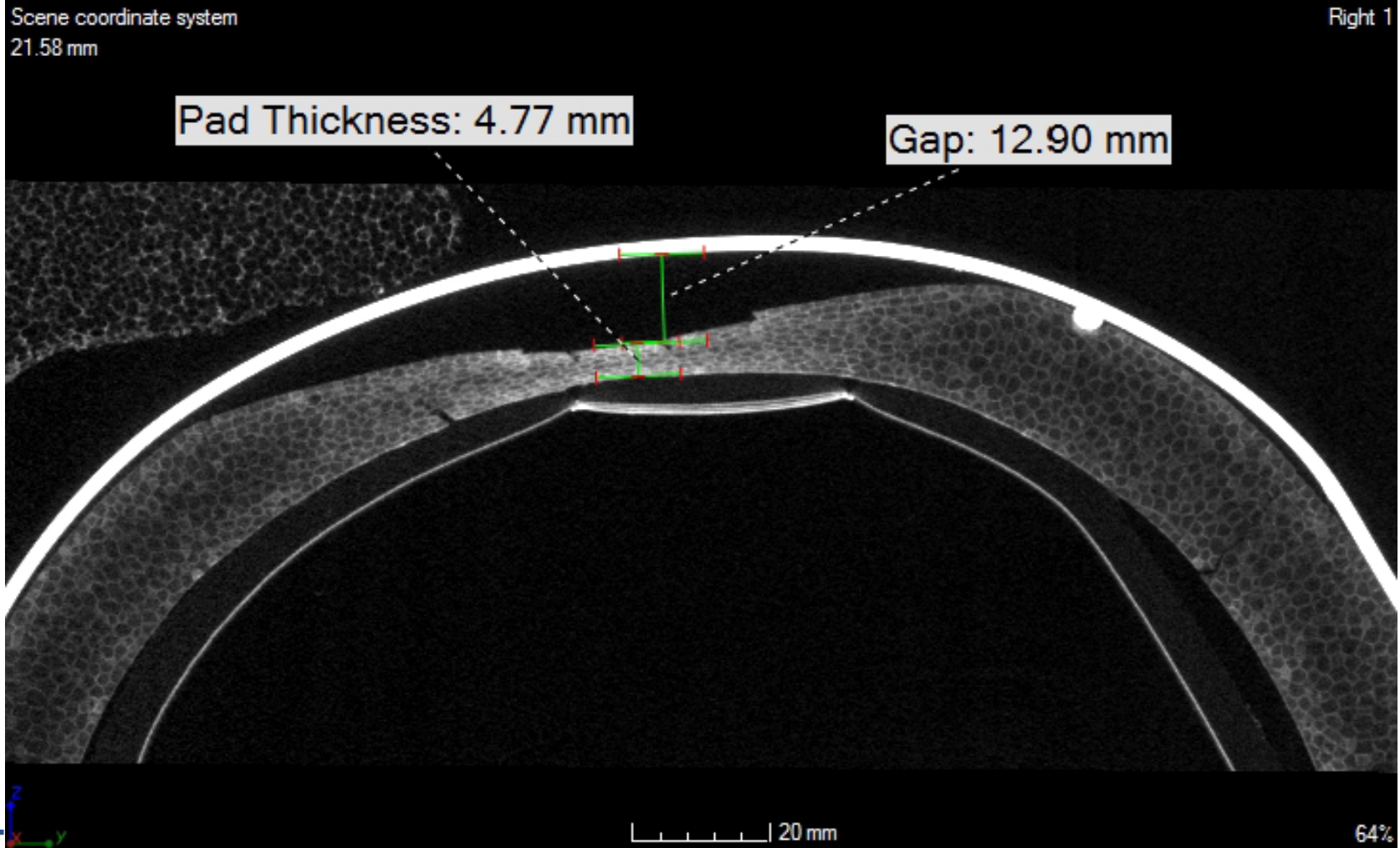
LAS Pre



LAS Drop 1



LAS Drop 4



Helmet

- Should be replaced after a contact with the ground. While there may not appear to be any damage, the pad and gap between the pad and the shell is compromised
- Damage is increased sequentially after each subsequent hit.

Objective

- Provide update on data currently in the Jockey Injury Database



- <http://youtu.be/RzyJYH0kMVE>



- **The data collection system has been created with the assistance of Keeneland, The Jockey Club and the National Thoroughbred Racing Association (NTRA) Safety and Integrity Alliance.**

FOR IMMEDIATE RELEASE

Jockeys' Guild announces launch of Jockey Injury Database; aim is to track trends, protect riders

NICHOLASVILLE, Ky. (April 4, 2012) –The Jockeys' Guild today announced the creation of the Jockey Injury Database, a new program aimed at preventing rider injuries in the future.

The Jockey Injury Database will collect information on jockey injuries at racetracks, including where, when and how injuries occurred, what type of equipment riders were wearing at the time, and the nature and severity of the injuries.

When a jockey injury occurs, the information will be gathered confidentially by medical personnel at racetracks, as well as by Guild representatives, and then entered into a database to be analyzed at a later date. In the database, jockeys will not be identified by name nor will the tracks where incidents occur.

- Direct losses associated with injury include inability to work, potential decrease of success for a mount, medical costs, rehabilitation and disruption of family life and the stable.



Professional Jockeys

- On average weigh approximately 110 pounds
- Reported to be in better physical condition than professional football, baseball, basketball, and hockey players.



Professional Jockeys

- Ride an animal which weighs approximately 1500 pounds, running at speeds of 30-40 mph.
- Injuries at these speeds can have catastrophic consequences



CODE: 009
Internal use only

1. Male Female 2. Apprentice Professional jockey: (number of years) 15

3. Location of Incident: Paddock Post parade Loading into the gate In the gate
 At start First half of race In final turn In stretch Galloping out
 Returning to unsaddle

Race Specifics: 4. Size of field: 9 (6) 5. Distance: 6 Furlongs 6. Purse: \$ 11,520

7. Surface: Dirt Synthetic Turf
7A. Surface Condition of Dirt: Fast Good Muddy Sloppy
7B. Surface Condition of Turf: Firm Good Soft Yielding

8. Age: 2 YO 3 YO 3 YO & UP 4 YO & UP
9. Race Horse Gender: M F
10. Race Gender: C&G F&M Open
11. Race Type: MSW MDN Claiming \$ 5,000 Claiming \$ _____ Starter ALW
 Allowance optional claiming \$ _____ ALW Handicap Stake Race Other _____

12. Cause of Incident: (check all that apply):
 Thrown by horse (non-breakdown) Thrown by horse (breakdown) Clipped heels Collision
 Fell over fallen horse on track Thrown or pinned by horse in gate Equipment failure
 Other (specify): _____

13. Result of Incident: Non-Injury Injury (Returned to ride same day) Injury (Did NOT return same day)



12. Cause of Incident:
(check all that apply):

- Thrown by horse (non-breakdown) Thrown by horse (breakdown) Clipped heels Collision
 Fell over fallen horse on track Thrown or pinned by horse in gate Equipment failure
 Other (specify): _____

13. Result of Incident:

- Non-Injury Injury (Returned to ride same day) Injury (Did NOT return same day)

14. Cause of Injury:
(check all that apply):

- Injured on horse Injured in fall Trampled by horse Kicked by horse Pinned by horse Other _____

15. Site of Impact:

- Ground Rail Gate Other (specify): N/A

16. On-track Medical Staff:
(check all that apply):

- Doctor Nurse Paramedic EMT Other _____

17. On-track Medical Care:

- No treatment necessary Treated and released Treated, then transported to hospital
 Transported immediately to hospital

18. Was hospitalization required for the injury? Yes No

19. Type of Helmet:

- Champion
 Charles Owen
 GPA Sport
 LAS Helmets
 Other
(specify model type of helmet):
Caliente

20. Helmet Certification:

- ASTM F1163
 EN 1384 / BS EN 1384
 AS/NZS 3838
 Snell
 Other (specify): _____
 No Certification
 No Record

21. Type of Body Protection

- Air Vest
 Hows Racesafe
 Phoenix Vest (Tipparary)
 Vipa Vest
 Other (specify model type): Excalibur
 None
 Not Recorded

22. Body Protection Certification:

- ASTM F1937
 ASTM F2681
 EN 13158
 SATRA
 Other (specify): _____
 No Certification
 Not Recorded

3. Nature of Injury (check all that apply):

[Fx=Fracture, Str/Spr=Strain/Sprain, Disl=Dislocation, Sx=Surgery]

- | | | | | | | | | | | |
|---|-----------------------------|----------------------------------|---|-----------------------------|---|-------------------------------|---|-----------------------------|----------------------------------|-------------------------------|
| <input type="checkbox"/> Head/Skull | <input type="checkbox"/> Fx | <input type="checkbox"/> Sx | <input type="checkbox"/> Upper arm (humerus) | <input type="checkbox"/> Fx | <input type="checkbox"/> Str/Spr | <input type="checkbox"/> Sx | <input type="checkbox"/> Thigh (femur) | <input type="checkbox"/> Fx | <input type="checkbox"/> Str/Spr | <input type="checkbox"/> Sx |
| <input type="checkbox"/> Concussion | | | <input type="checkbox"/> Lower arm (radius/ulna) | <input type="checkbox"/> Fx | <input type="checkbox"/> Str/Spr | <input type="checkbox"/> Sx | <input type="checkbox"/> Knee | <input type="checkbox"/> Fx | <input type="checkbox"/> Str/Spr | <input type="checkbox"/> Disl |
| <input type="checkbox"/> Facial bones | <input type="checkbox"/> Fx | <input type="checkbox"/> Sx | <input type="checkbox"/> Wrist | <input type="checkbox"/> Fx | <input type="checkbox"/> Str/Spr | <input type="checkbox"/> Disl | <input type="checkbox"/> Lower leg (tibia/fibula) | <input type="checkbox"/> Fx | <input type="checkbox"/> Str/Spr | <input type="checkbox"/> Sx |
| <input type="checkbox"/> Eyes | | <input type="checkbox"/> Sx | <input type="checkbox"/> Hand | <input type="checkbox"/> Fx | <input type="checkbox"/> Str/Spr | <input type="checkbox"/> Sx | <input type="checkbox"/> Ankle | <input type="checkbox"/> Fx | <input type="checkbox"/> Str/Spr | <input type="checkbox"/> Disl |
| <input type="checkbox"/> Ears | | <input type="checkbox"/> Sx | <input type="checkbox"/> Fingers | <input type="checkbox"/> Fx | <input type="checkbox"/> Str/Spr | <input type="checkbox"/> Disl | <input type="checkbox"/> Foot | <input type="checkbox"/> Fx | <input type="checkbox"/> Str/Spr | <input type="checkbox"/> Disl |
| <input type="checkbox"/> Nose | <input type="checkbox"/> Fx | <input type="checkbox"/> Sx | <input type="checkbox"/> Chest/Ribs | <input type="checkbox"/> Fx | <input type="checkbox"/> Str/Spr | <input type="checkbox"/> Sx | <input type="checkbox"/> Spinal cord injury | | | <input type="checkbox"/> Sx |
| <input type="checkbox"/> Jaw | <input type="checkbox"/> Fx | <input type="checkbox"/> Disl | <input type="checkbox"/> Abdominal injury | | | <input type="checkbox"/> Sx | <input type="checkbox"/> Paralysis | | | |
| <input type="checkbox"/> Neck (cervical spine) | <input type="checkbox"/> Fx | <input type="checkbox"/> Str/Spr | <input type="checkbox"/> Upper back (thoracic spine) | <input type="checkbox"/> Fx | <input type="checkbox"/> Str/Spr | <input type="checkbox"/> Sx | <input type="checkbox"/> Soft tissue injury | | | <input type="checkbox"/> Sx |
| <input type="checkbox"/> Shoulder | <input type="checkbox"/> Fx | <input type="checkbox"/> Str/Spr | <input checked="" type="checkbox"/> Lower back (lumbar spine) | <input type="checkbox"/> Fx | <input checked="" type="checkbox"/> Str/Spr | <input type="checkbox"/> Sx | <input type="checkbox"/> Death | | | |
| <input type="checkbox"/> Collar bone (clavicle) | <input type="checkbox"/> Fx | <input type="checkbox"/> Sx | <input type="checkbox"/> Pelvis | <input type="checkbox"/> Fx | <input type="checkbox"/> Str/Spr | <input type="checkbox"/> Sx | <input type="checkbox"/> Other (specify): _____ | | | |
| <input type="checkbox"/> Elbow | <input type="checkbox"/> Fx | <input type="checkbox"/> Disl | <input type="checkbox"/> Hip | <input type="checkbox"/> Fx | <input type="checkbox"/> Str/Spr | <input type="checkbox"/> Disl | _____ | | | |

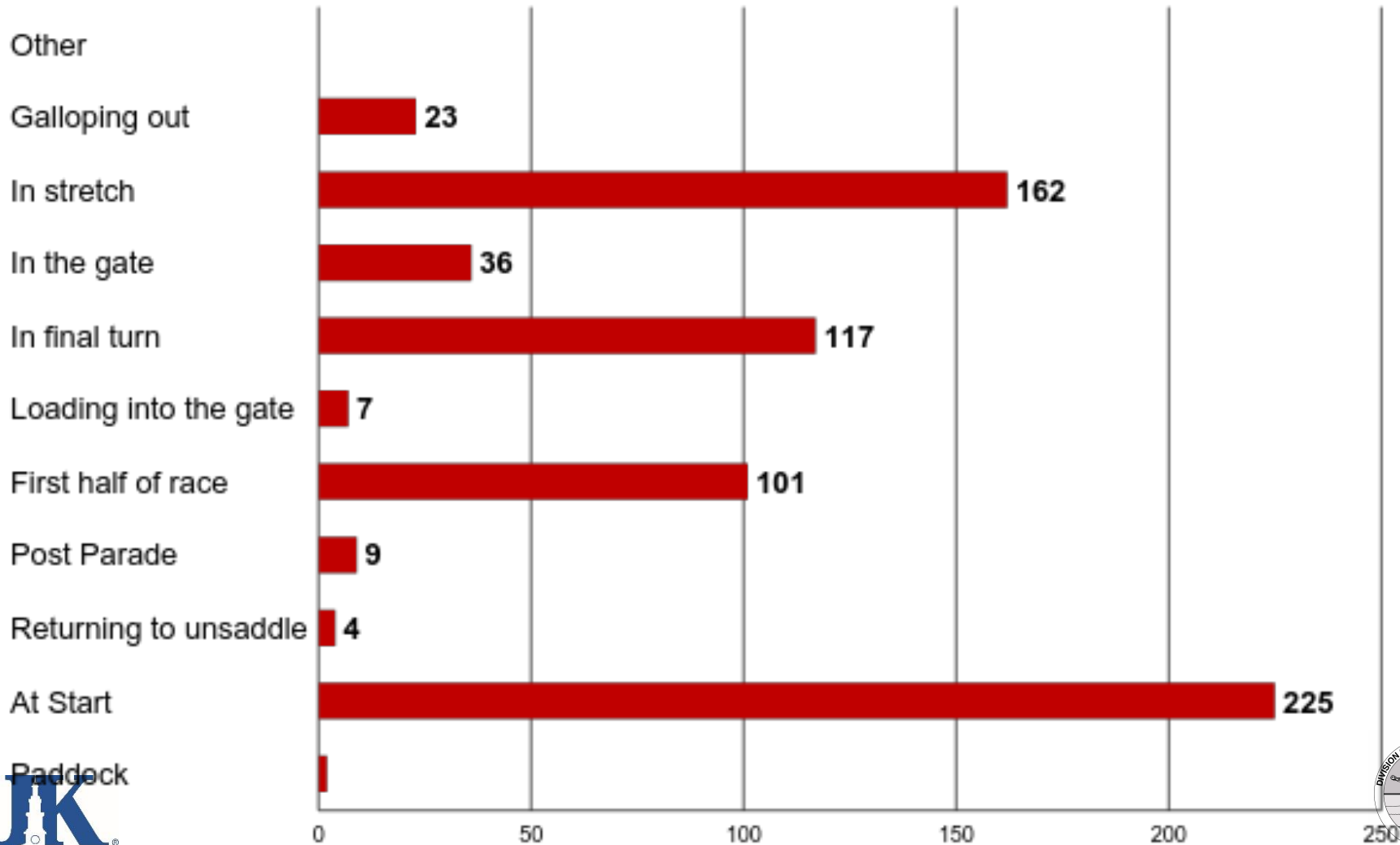
4. Length of Time to Return to Ride: (0 to 365 days or over) 3

Fax or e-mail completed form to: 859-219-9892 • Info@jockeysguild.com



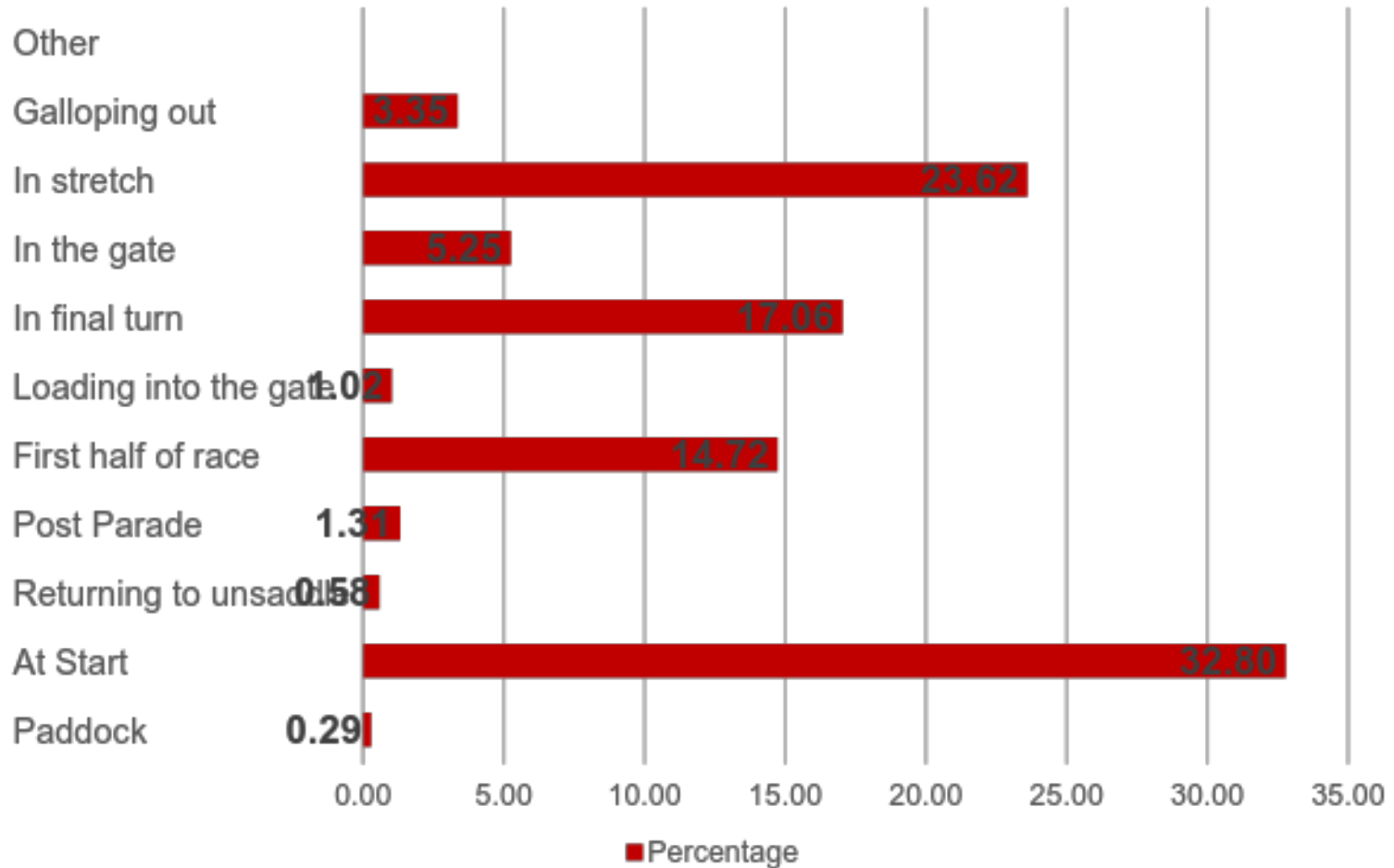
All Data

Location of Incident



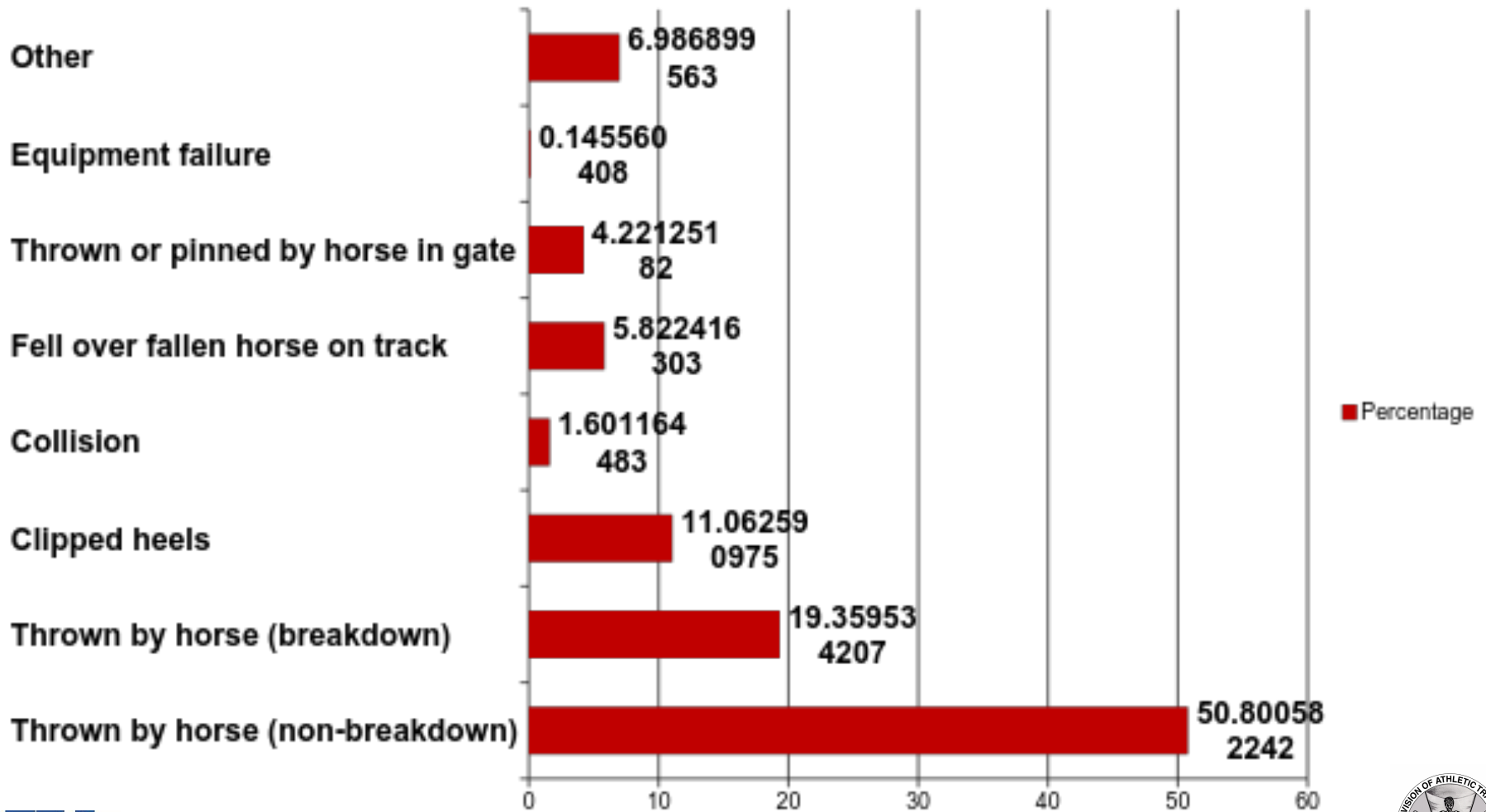
All Data

Location of Incident %



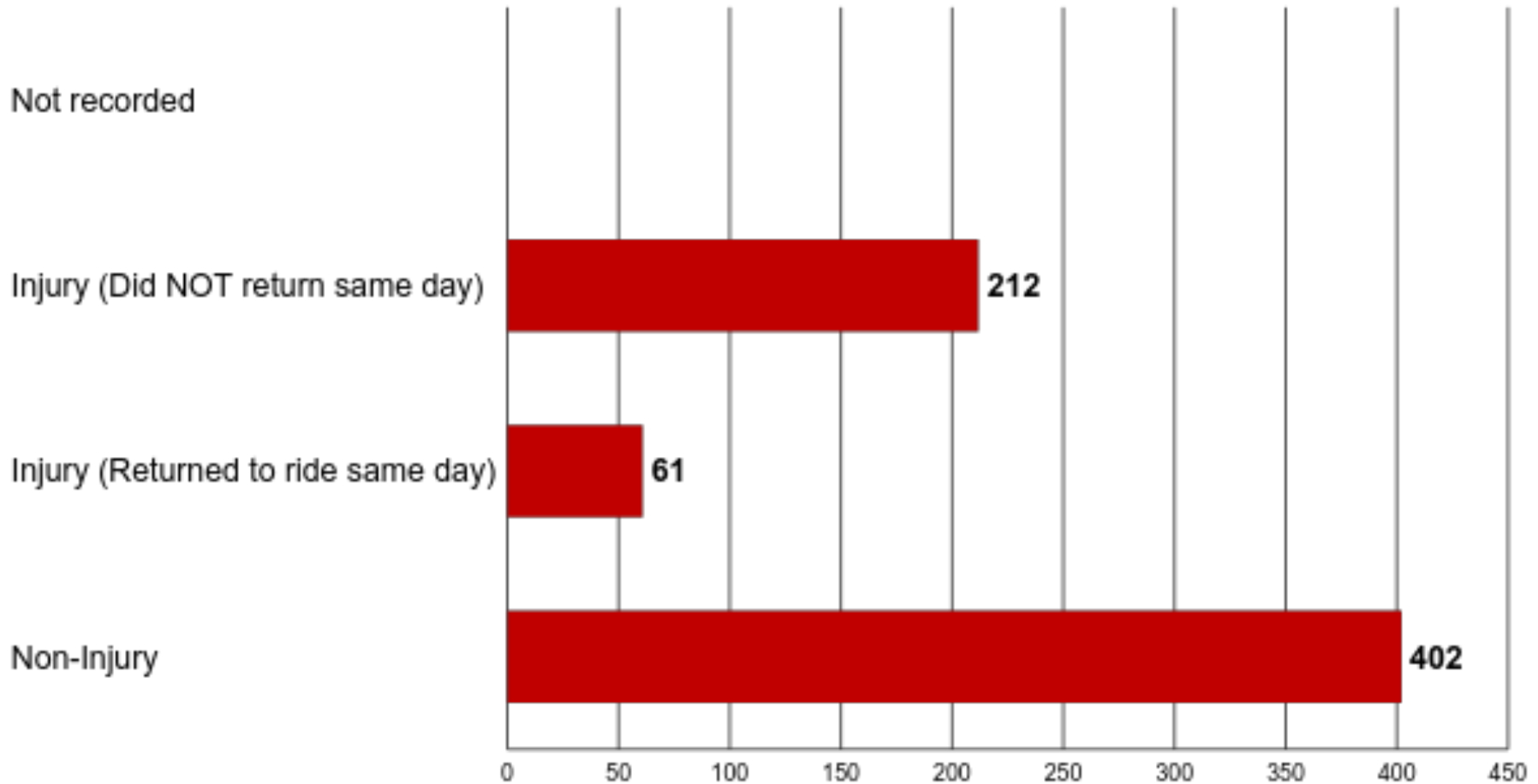
All Data

Cause of Incident's %



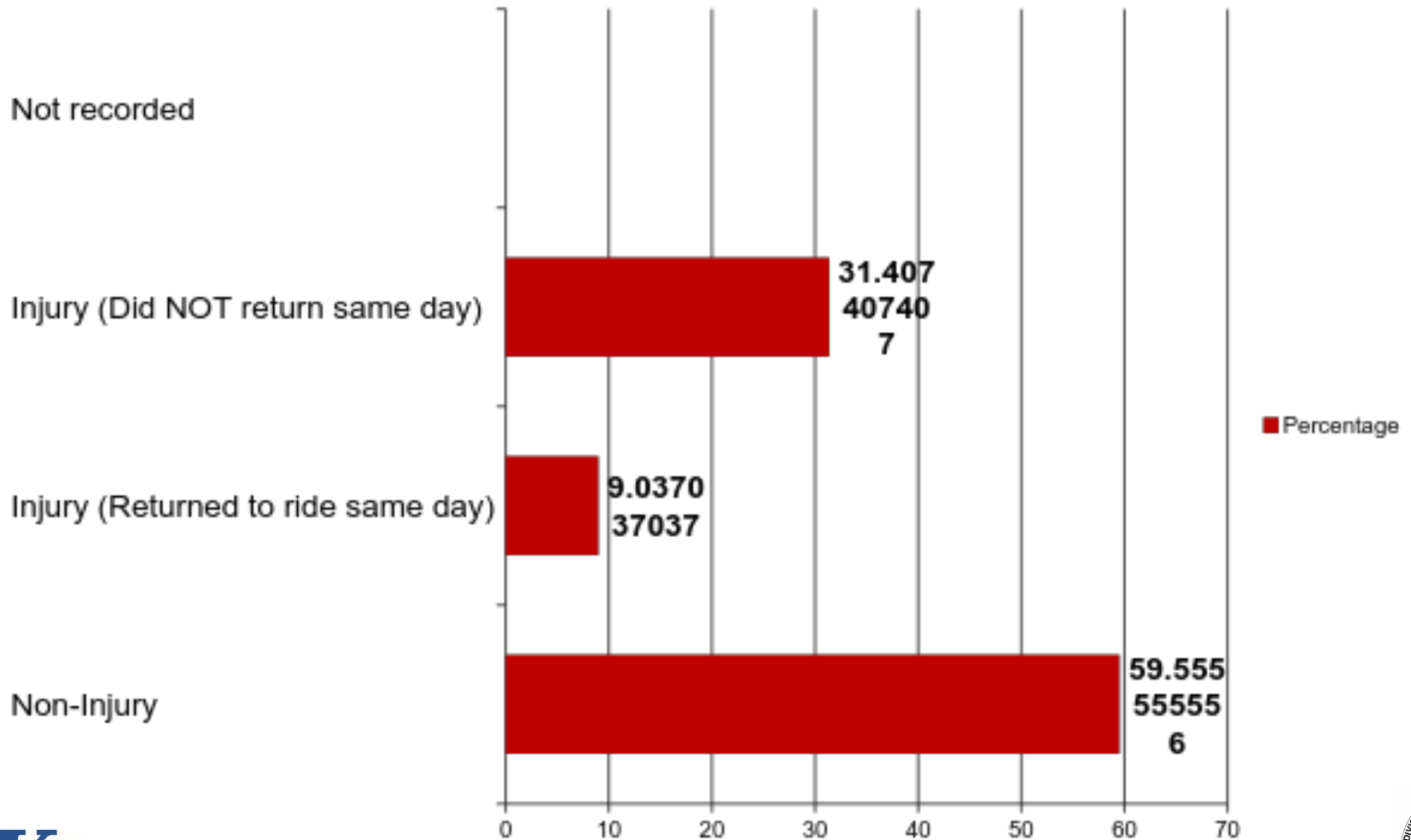
All Data

Result of Incident

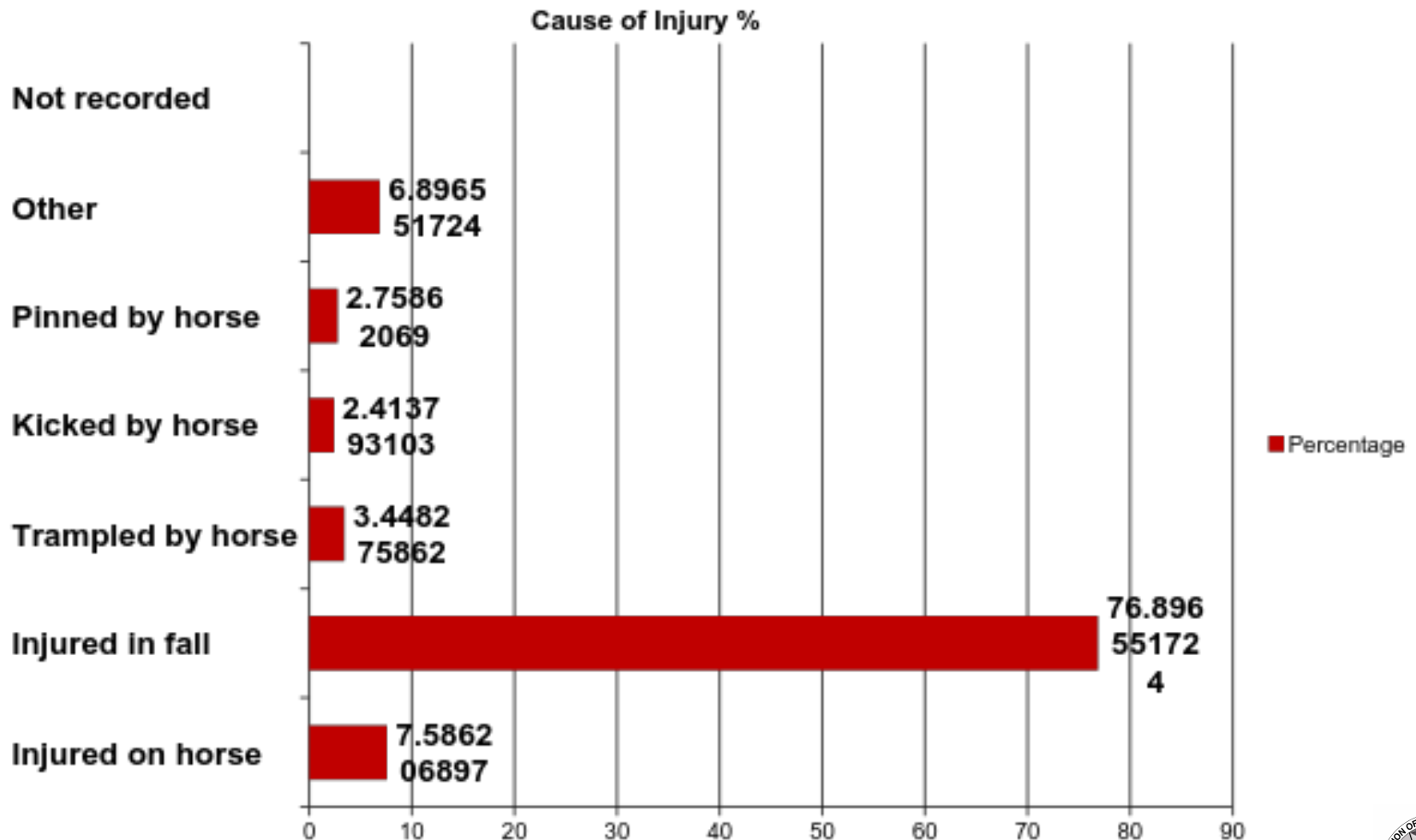


All Data

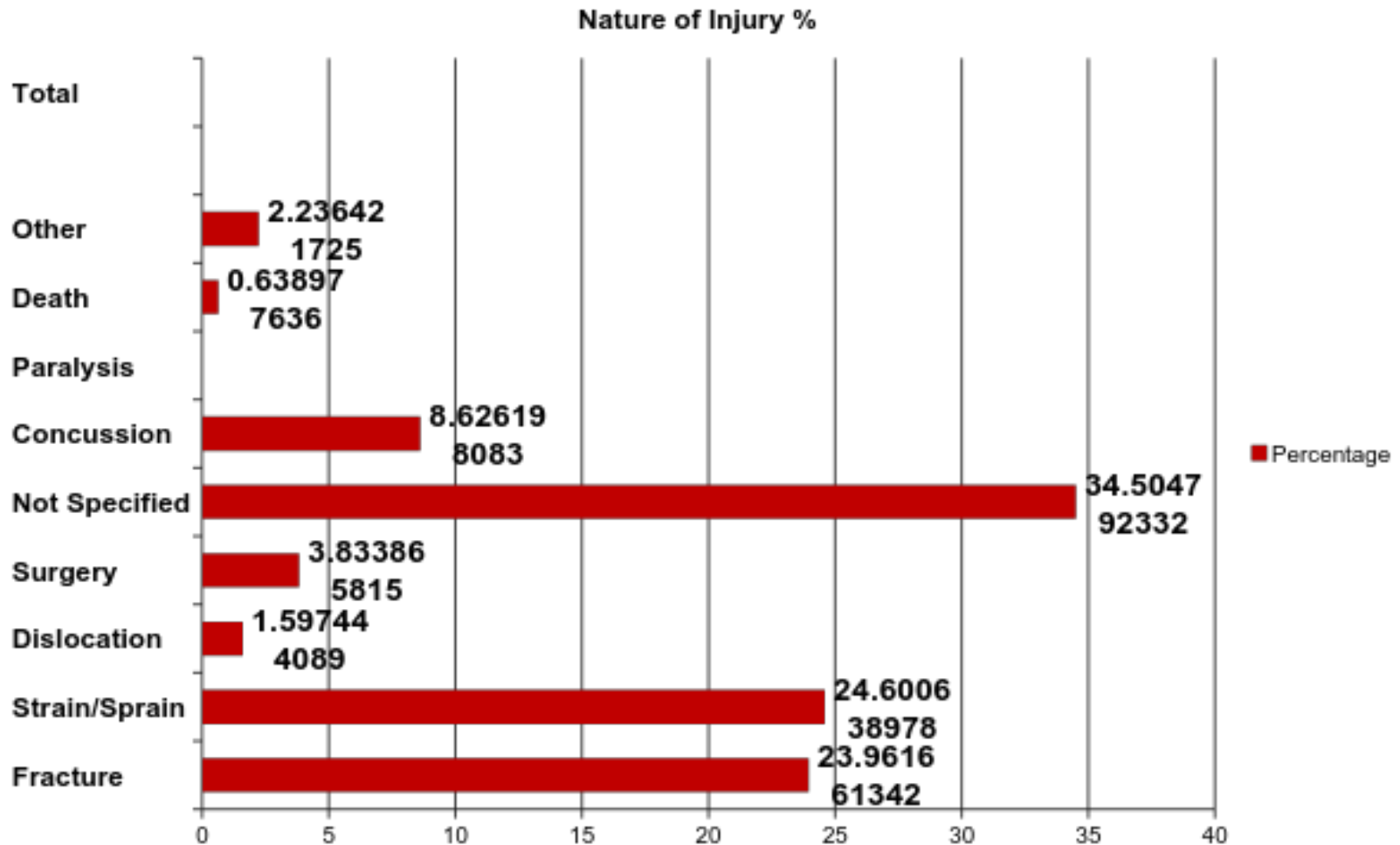
Result of Incident %



All Data

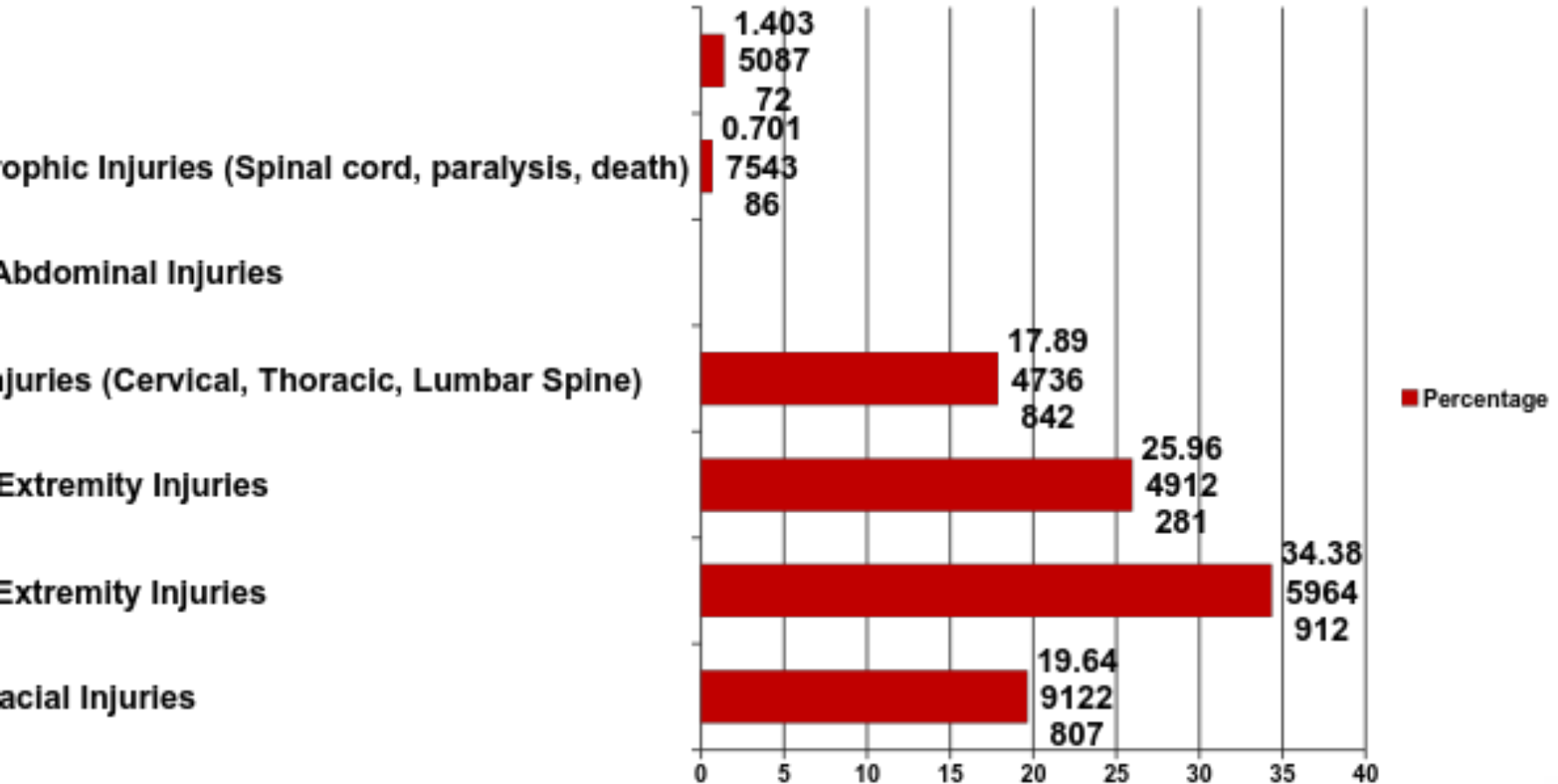


All Data



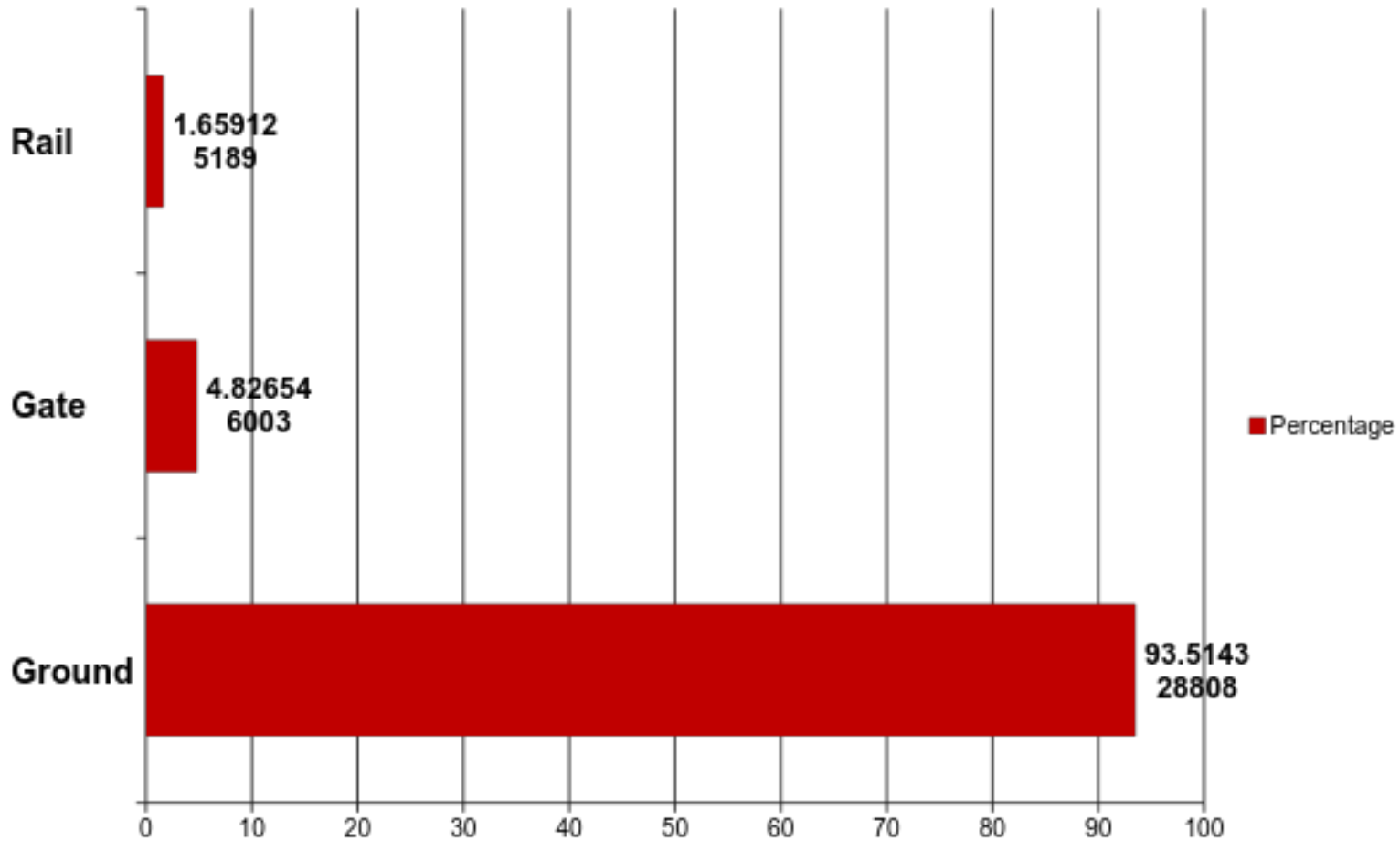
All Data

Injury by Region %



All Data

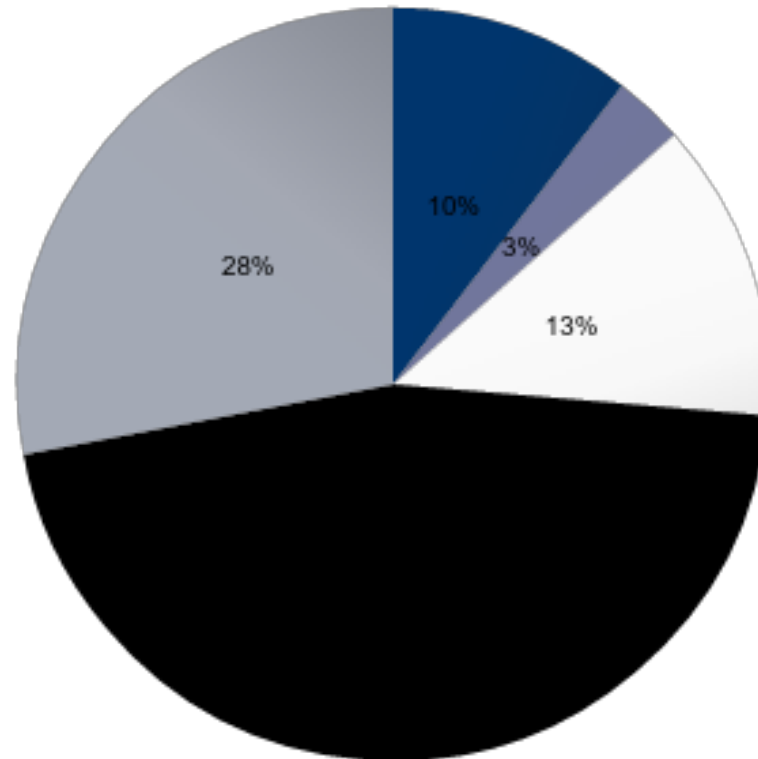
Site of Incident %



All Data

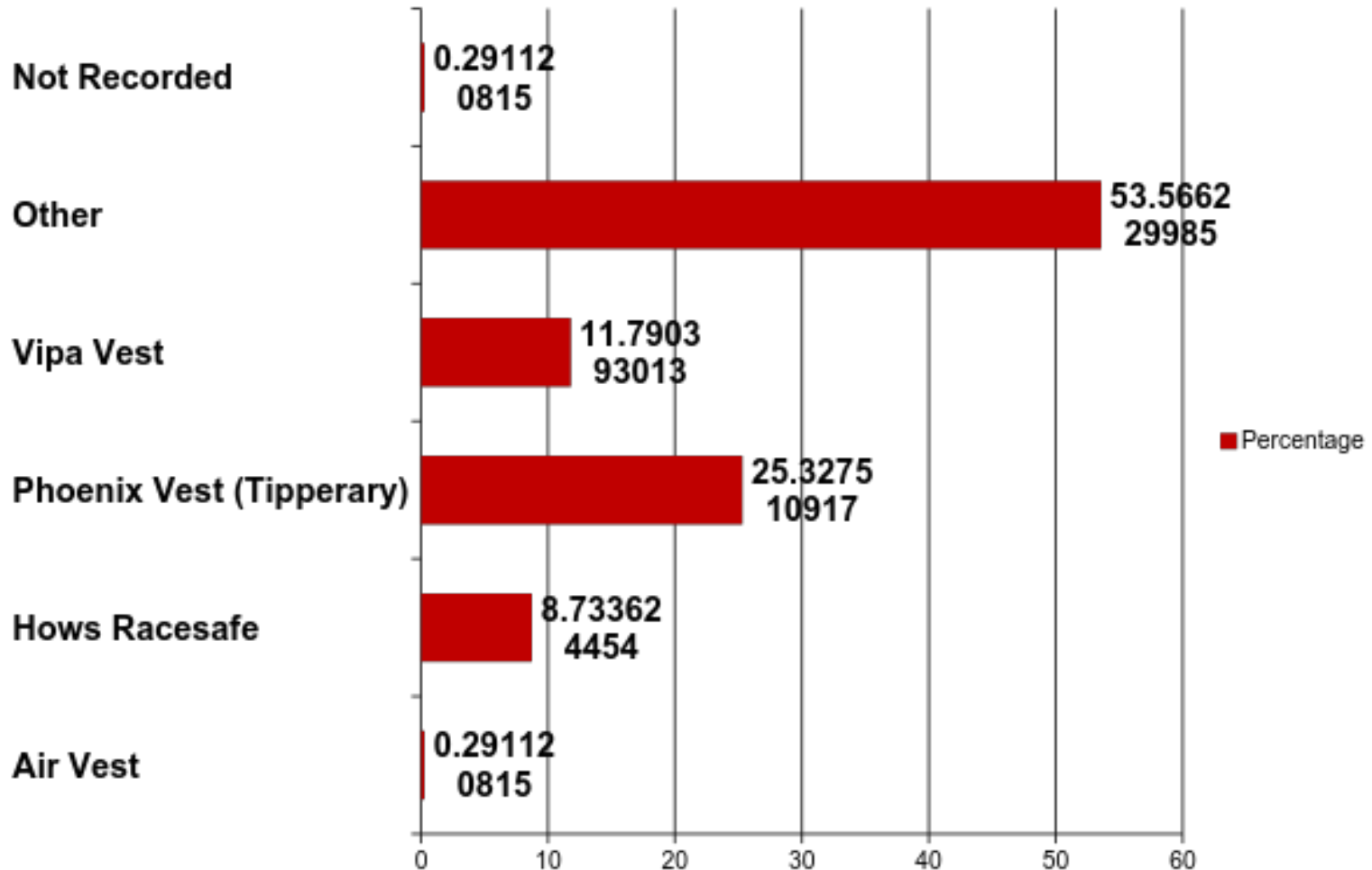
Helmet

■ Champion ■ Charles Owen ■ GPA Support ■ LAS Helmet ■ Other



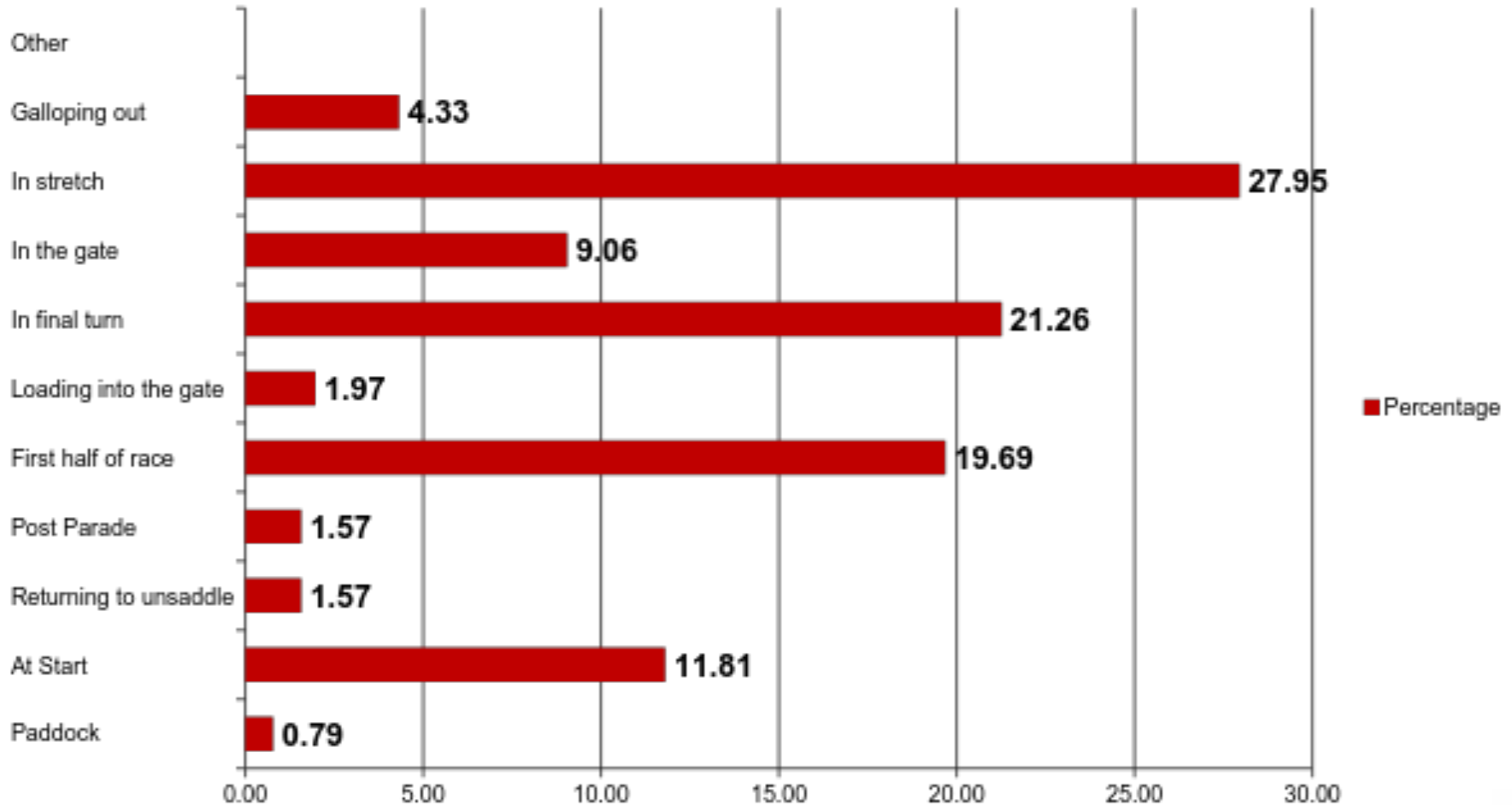
All Data

Type of Protection %

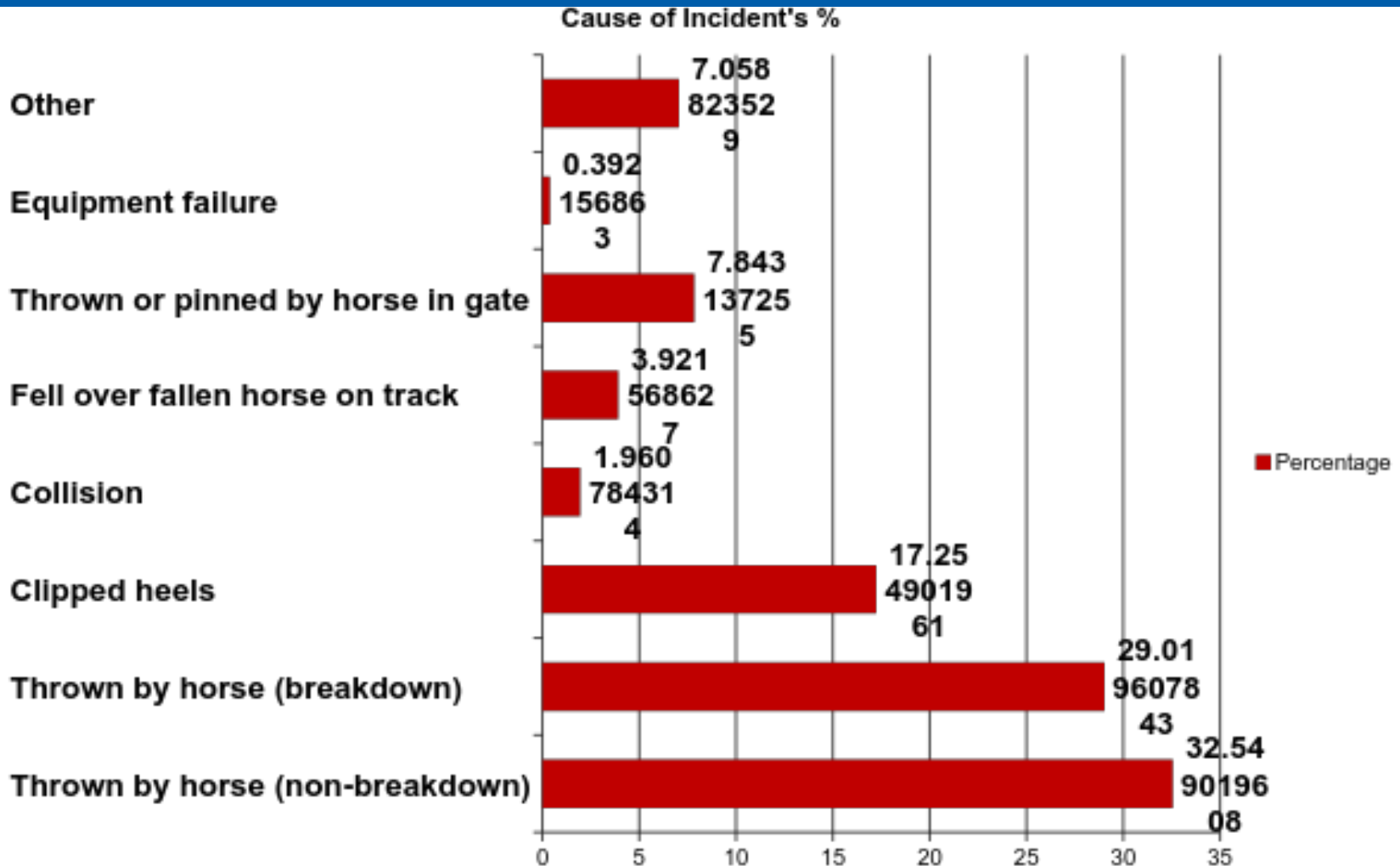


Injured Only

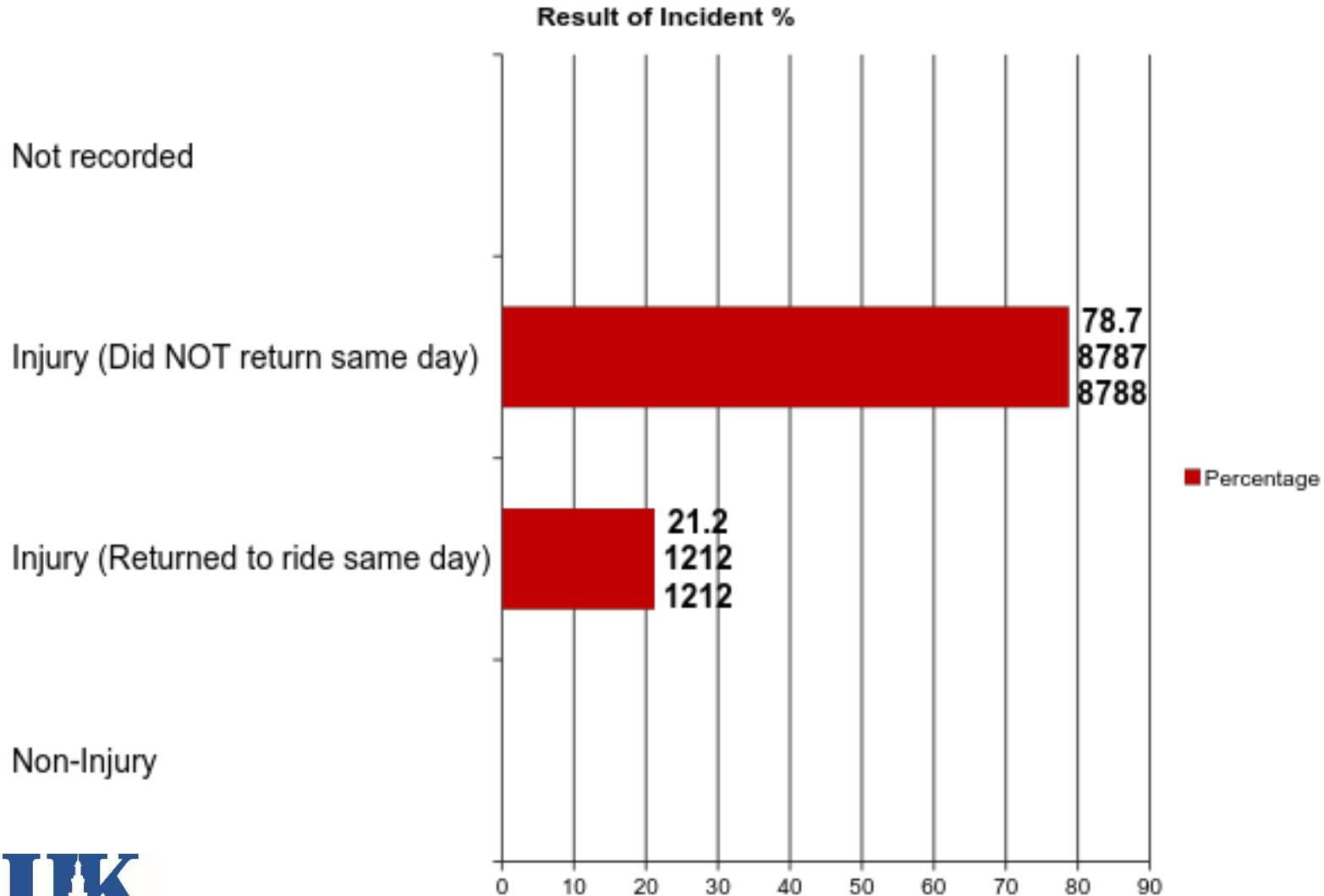
Location of Incident %



Injured Only

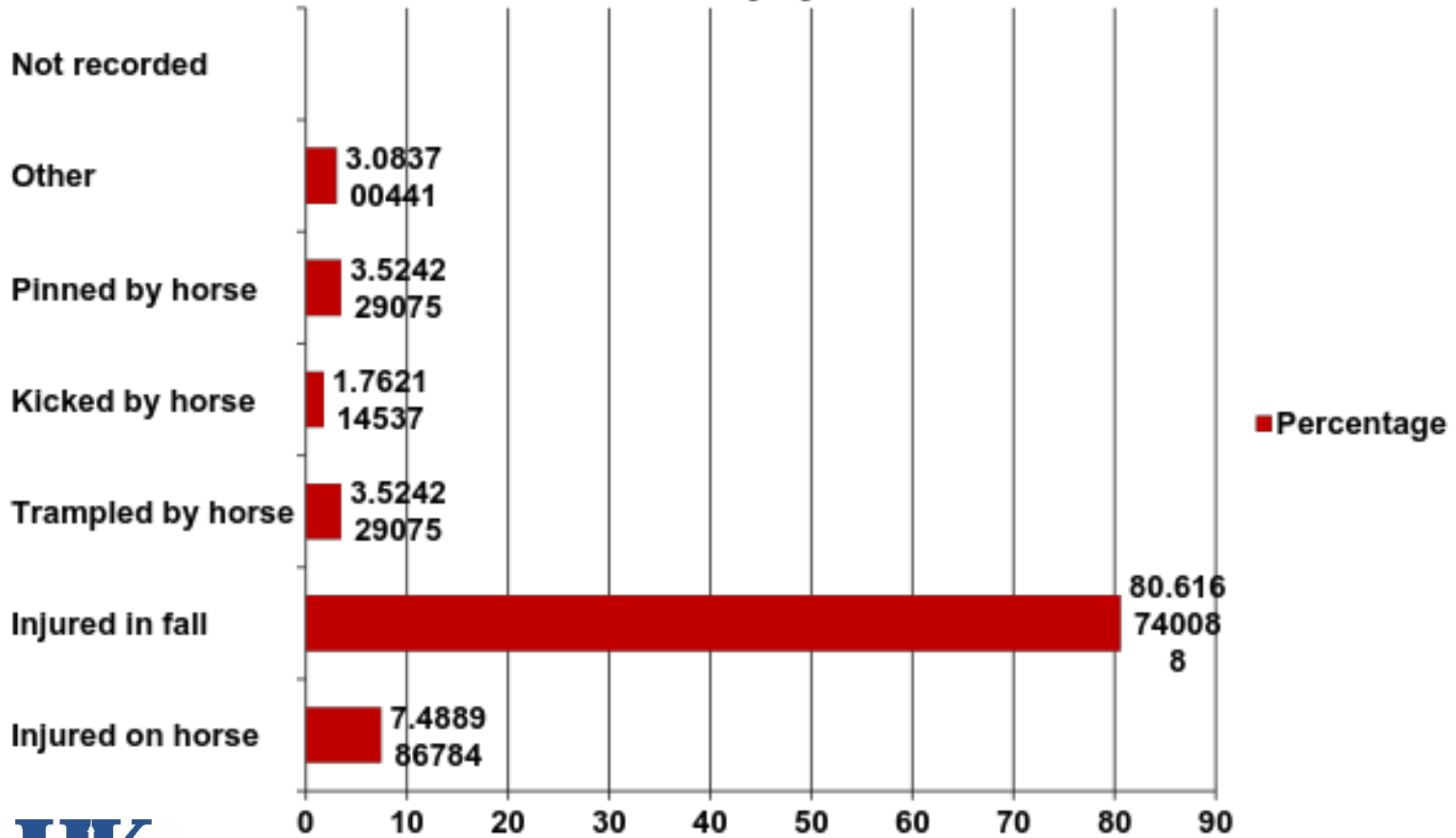


Injured Only

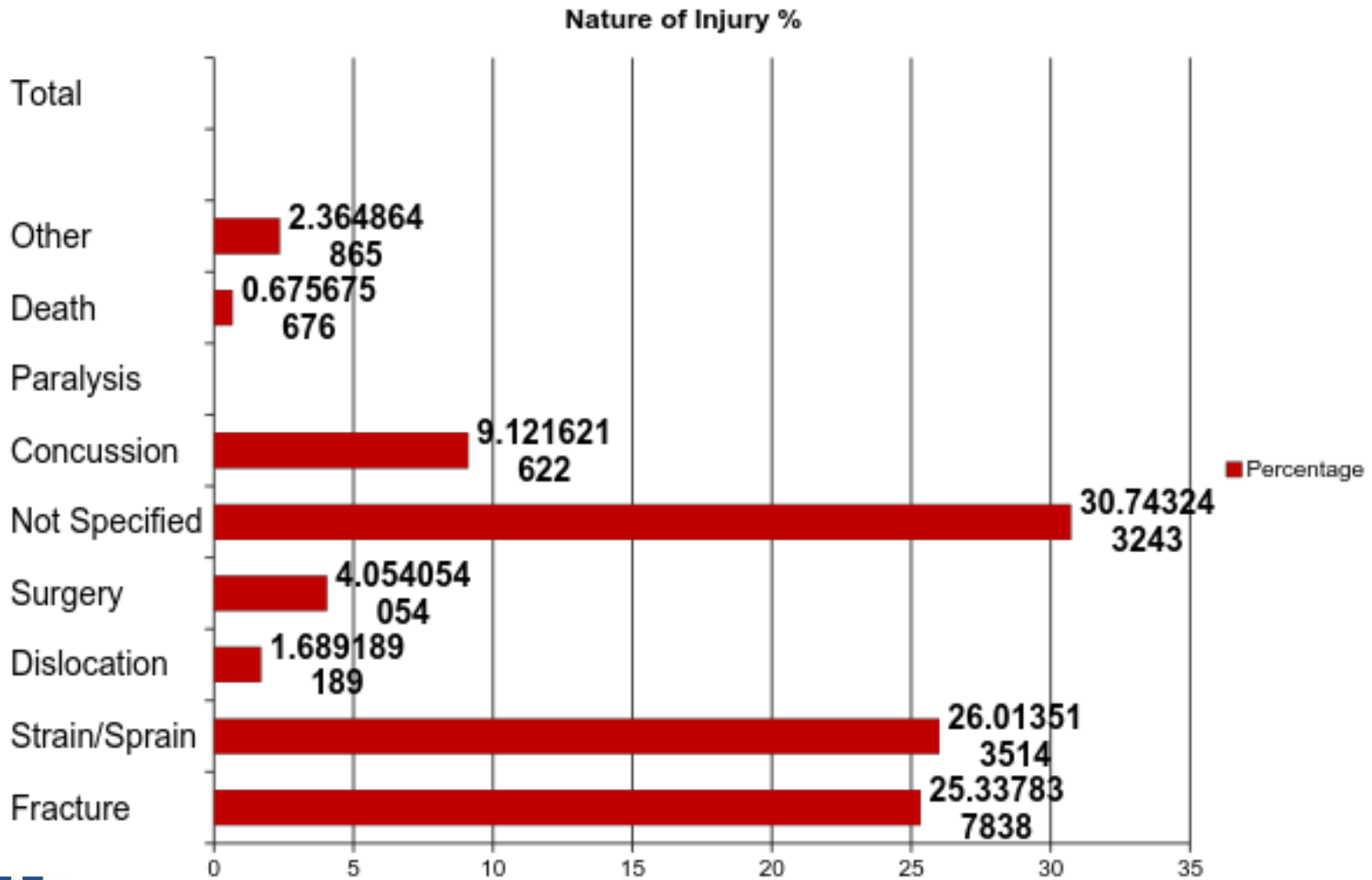


Injured Only

Cause of Injury %

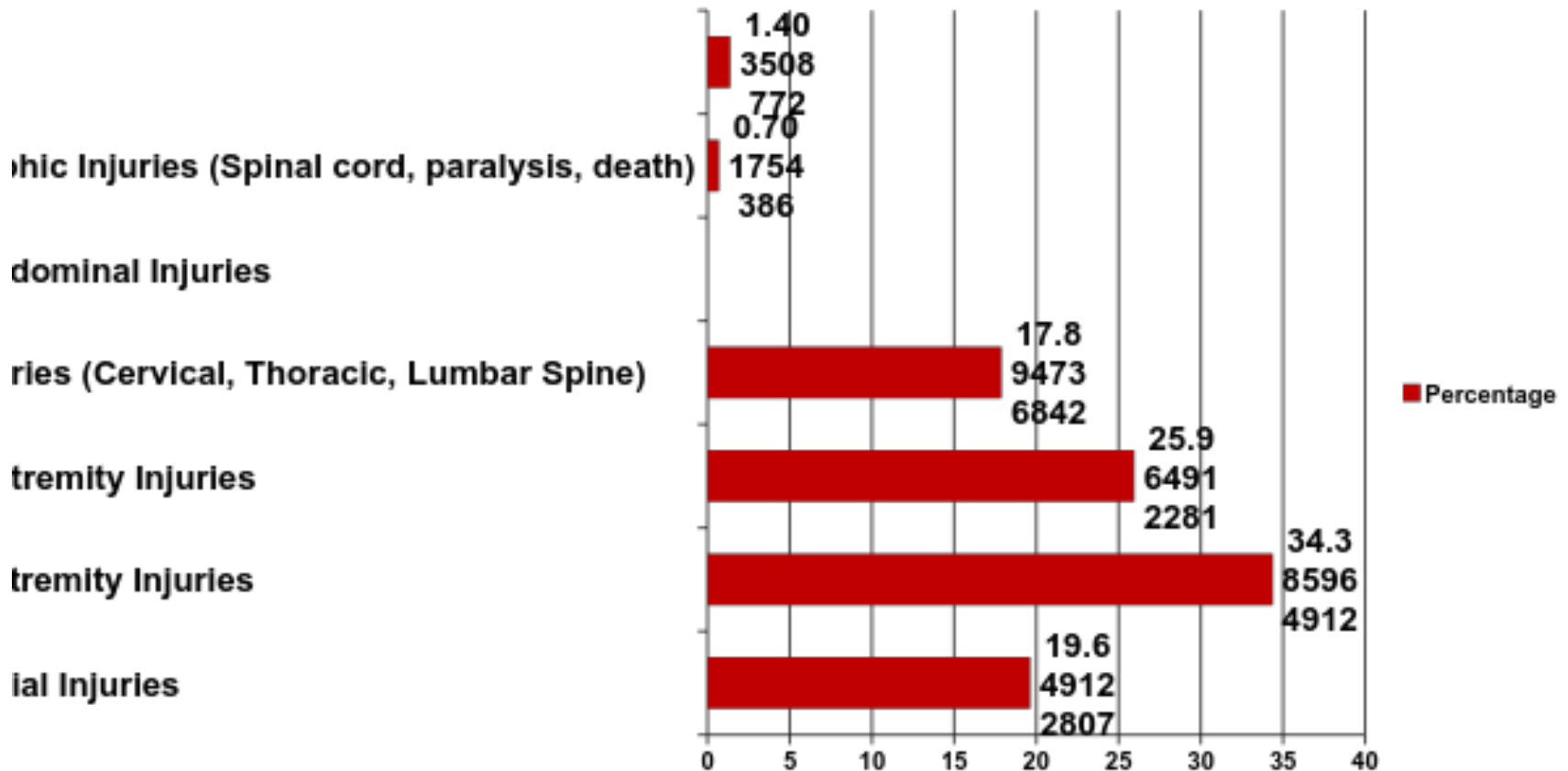


Injured Only



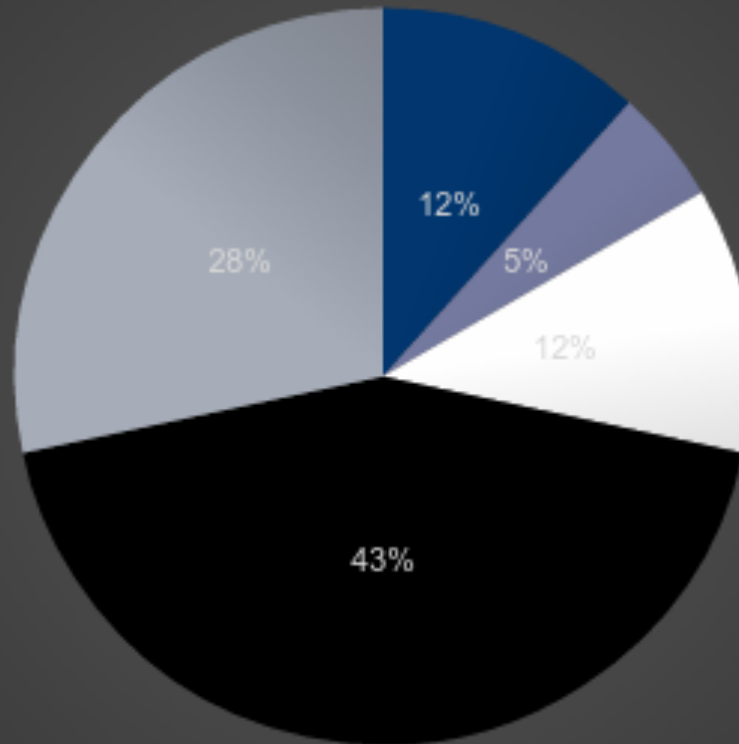
Injured Data

Injury by Region %



Injured Only

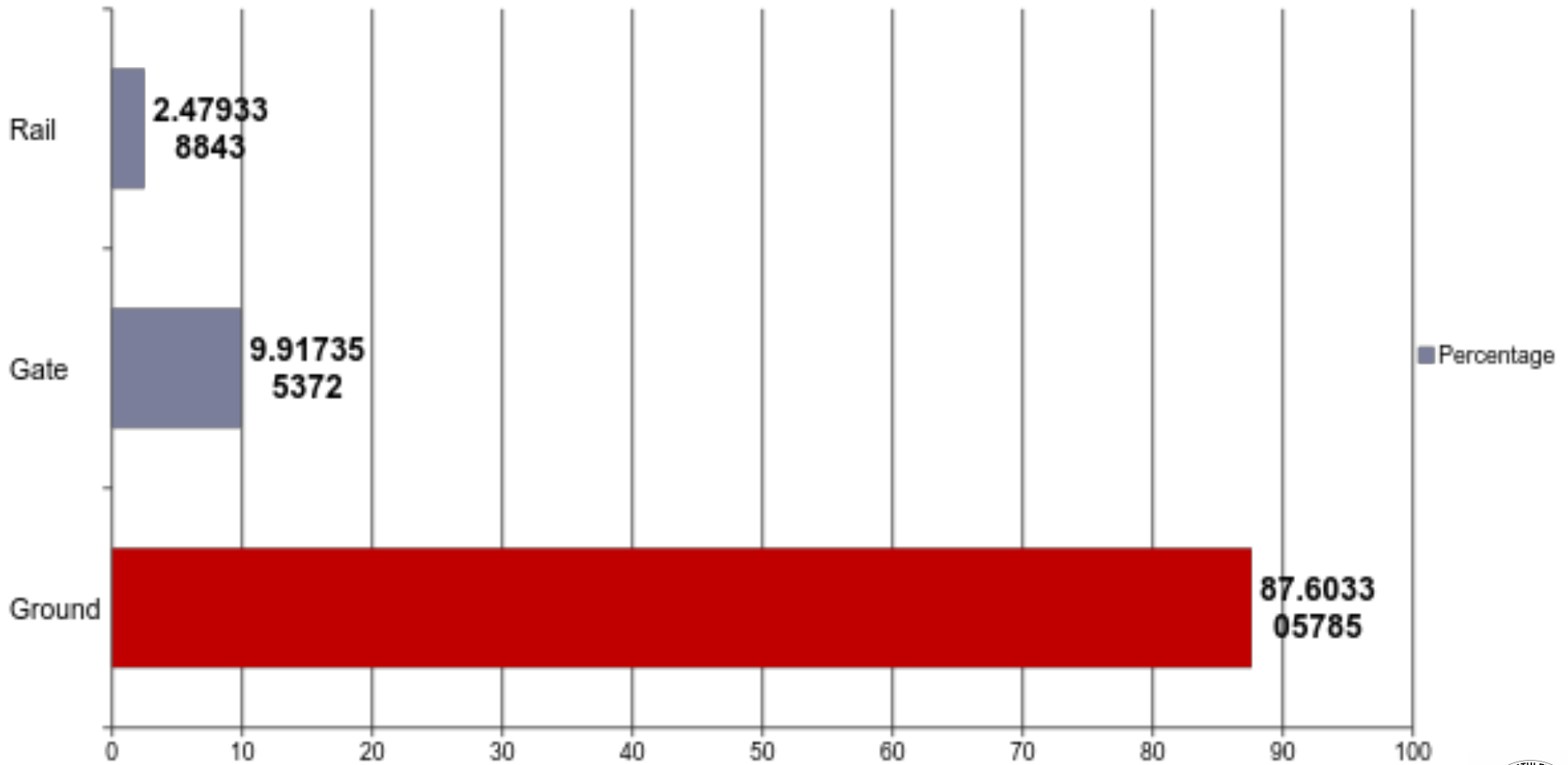
Helmet



■ Champion ■ Charles Owen ■ GPA Support ■ LAS Helmet ■ Other

Injured Only

Site of Incident %



- Of the 232 injuries, 79% did not return the same day and 21% were able to return the same day
- 699 total incidents in database where a jockey came off a horse.
- Of those, 232 resulted in an injury

All Entries (Incidents)	All Entries (Incidents)	Injured Only	Injured Only
<u>Location</u>		<u>Location</u>	
Start	32%	Start	11%
Stretch	24%	Stretch	28%
Final Turn	17%	Final Turn	22%
<u>Cause of Incident</u>		<u>Cause of Incident</u>	
Thrown by Horse No BD	51%	Thrown by Horse No BD	32%
Thrown by Horse Breakdown	20%	Thrown by Horse Breakdown	29%
<u>Result of Incident</u>		<u>Result of Incident</u>	
Non-Injury	60%	Non-Injury	0
Injury	40%	Injury	100%
Returned	90%	Returned	21%
Did not Return	31%	Did not Return	79%
<u>Cause of Injury</u>		<u>Cause of Injury</u>	
Injured in Fall	76%	Injured in Fall	80%
<u>Nature of Injury</u>		<u>Nature of Injury</u>	
Fracture	24%	Fracture	25%
Sprain	24%	Sprain	26%
Concussion	8%	Concussion	9%
Upper Extremity	37%	Upper Extremity	34%
Lower Extremity	26%	Lower Extremity	26%
		<u>Concussions</u>	
		Male	5.13%
		Female	33.33%
		<u>Lower back (lumbar spine)</u>	
		Male	4.62%
		Female	11.11%

Recommendations

- Of those jockeys injured more than 1/4 were classified as wearing a helmet that did not reflect an ASTM listed helmet
- An unknown percentage of the helmets listed as “other” likely include Caliente Style helmets
- Caliente Style helmets failed Helmet Impact Testing and should be banned from equestrian racing

- Therefore for the data that we currently have, half of the times a jockey comes unseated they will suffer an injury!
- Number of Days Out
 - Mean 16.7 36.01
 - Median 1.5
 - Mode 0

Challenges

- In order to capture the incidence of an injury:

Incidence:

Number of new cases of the disease/injury over a period of time

Number of people at risk during that period

Absolute incidence rate : $\frac{\text{Number of injuries}}{\text{Number of exposure-events (games)}}$

Relative incidence rate : $\frac{\text{Number of new cases}}{\text{Population time}}$

Incidence

- Need Number of
 - Race Rides
 - Races
 - Race Meets
- Usually Number of new injuries or Falls per 1000 exposures or per 1000 race rides
- We will provide incidence data for Keeneland after the Spring 2016 Meet

Future Considerations

- Assess and Seek to Improve Performance and Physiologic Output, Nutrition and Injury Prevention for the jockeys much like in other sports



Future Considerations

- Important momentum that has taken place in 1 Year
- COOPERATION
 - JOCKEYS
 - Tracks
 - Regional Managers
- Initiative to develop a Research and Education Committee

Thoughts to Ponder

- Horseracing is similar to other sports
 - Emphasis on public perception
 - Increased awareness of long term health
- Majority of injuries are from falling
 - Better conditioned athlete
 - Better protection
 - Better identification of potential long-term sequelae

Thoughts to Ponder

- Need continued influence to make changes similar to other professional sports
- Continue to foster an atmosphere where there is emphasis on building proactive approach to prevention and care

Future Considerations

- Identification of Injuries will provide the ability to better protect and seek preventative mechanisms to put the welfare of the Jockey at the forefront
- Better understanding equipment needs and Medical Response

Thanks

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Thank You!

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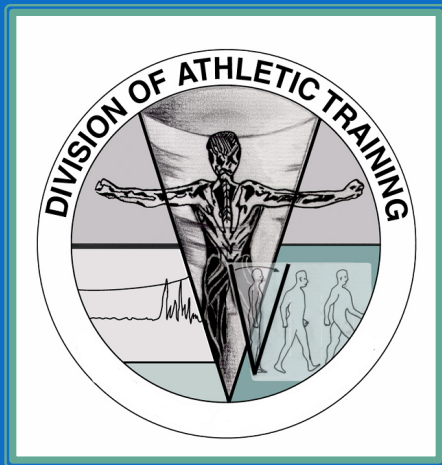
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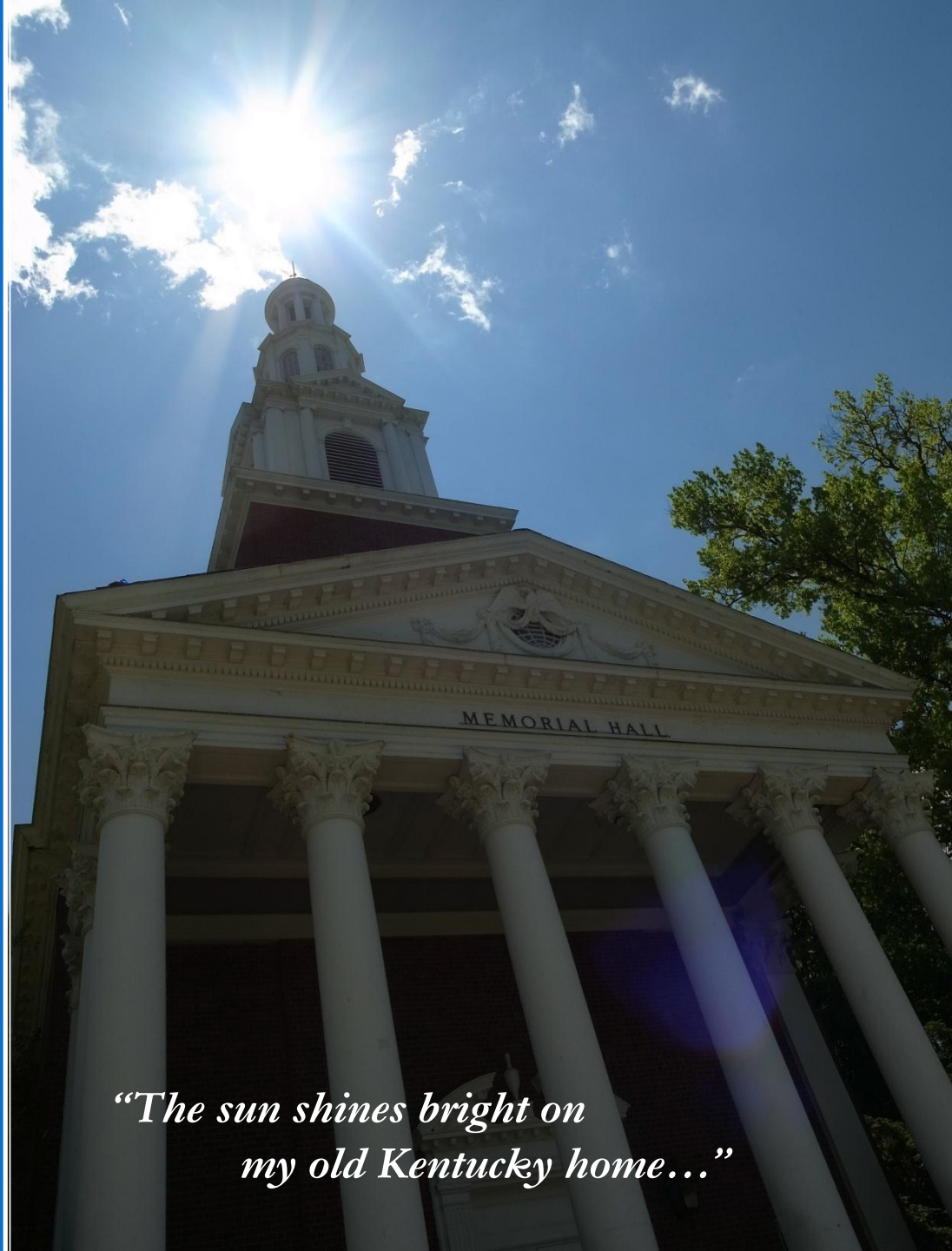
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*“The sun shines bright on
my old Kentucky home...”*